# Contrasts in Asthma Care

by

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To my parents

Declaration

The work described in this thesis is my own, with the exception that the surveys described in Chapters 7 and 8 were initiated by a group of general practitioners, physicians, paediatricians and community medicine specialists to which I was co-opted in the early stages. I therefore played an important part in the study design and thereafter undertook the running of these surveys and their analysis.

Acknowledgements

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CONTENTS

ABSTRACT

Unnecessary, preventable death from asthma has been widely reported. This thesis examines the management of two groups of asthmatics, one admitted to hospital and the other cared for in the community, to determine the extent of under-treatment of asthma.

In a prospective study of 157 acute asthma cases reviewed at home 13 days after hospital discharge, at least 34% had symptoms of poor asthma control. Subgroup analysis showed that under-use of corticosteroids ($p = 0.04$) and of peak flow measurements in assessment ($p<0.005$), and a failure to increase inhaled therapy at the time of discharge ($p<0.005$) or to review patients subsequently ($p<0.005$), were associated with a greater likelihood of continuing symptoms ($p = 0.03$). In hospital practice, therefore, suboptimal management was found to be commonly associated with excess morbidity.

In community practice a sample of 701 asthma attendances to a group of practitioners was compared with 81 attendances over the same period to a single practitioner with a special interest in asthma.

The interested practitioner used inhaled corticosteroids more often ($p<0.005$) and long term oral steroids less ($p<0.05$). If therapy was changed this practitioner preferred to increase inhaled therapy (68%) whereas others tended to give antibiotics for increased asthma symptoms (56%). The interested practitioner used corticosteroids as second line therapy whereas

for other practitioners steroids were the fourth and least likely treatment option, after antibiotics, oral bronchodilators or an increase in inhaled therapy.

After the controlled introduction of an asthma management programme to half of the survey population of practitioners and patients there was an increase in the use of inhaled corticosteroids, as judged from repeat prescriptions ($p<0.001$). In addition antibiotics were used less often ($p<0.05$) and there was an upward trend in the use of oral corticosteroids in this group only.

Asthma management is therefore shown in both these settings to vary considerably and in the hospital group such variations are associated with differences in outcome. A programme of information and discussion has been assessed and shown to influence significantly doctors' management of asthma in the community.

TABLE 1

NATIONAL MORBIDITY SURVEY DATA FOR ASTHMA AND ASSOCIATED CONDITIONS (MALES AND FEMALES TOGETHER) (FLEMING, 1987)

| | No. of Patients Consulting | | No. (%) in whom only one of these diagnoses was made | |
|---|---|---|---|---|
| | 1970 | 1981 | 1970 | 1981 |
| Asthma | 2,993 | 5,410 | 1,696 (57) | 3,486 (64) |
| Hayfever | 3,082 | 6,067 | 2,598 (84) | 5,067 (83) |
| Acute Bronchitis | 16,905 | 17,899 | 14,804 (88) | 15,615 (87) |
| Chronic Bronchitis | 3,360 | 1,834 | 2,211 (66) | 1,116 (61) |

## CHAPTER 1 - INTRODUCTION AND REVIEW OF THE LITERATURE

### (i) Evidence for increasing morbidity and mortality from asthma

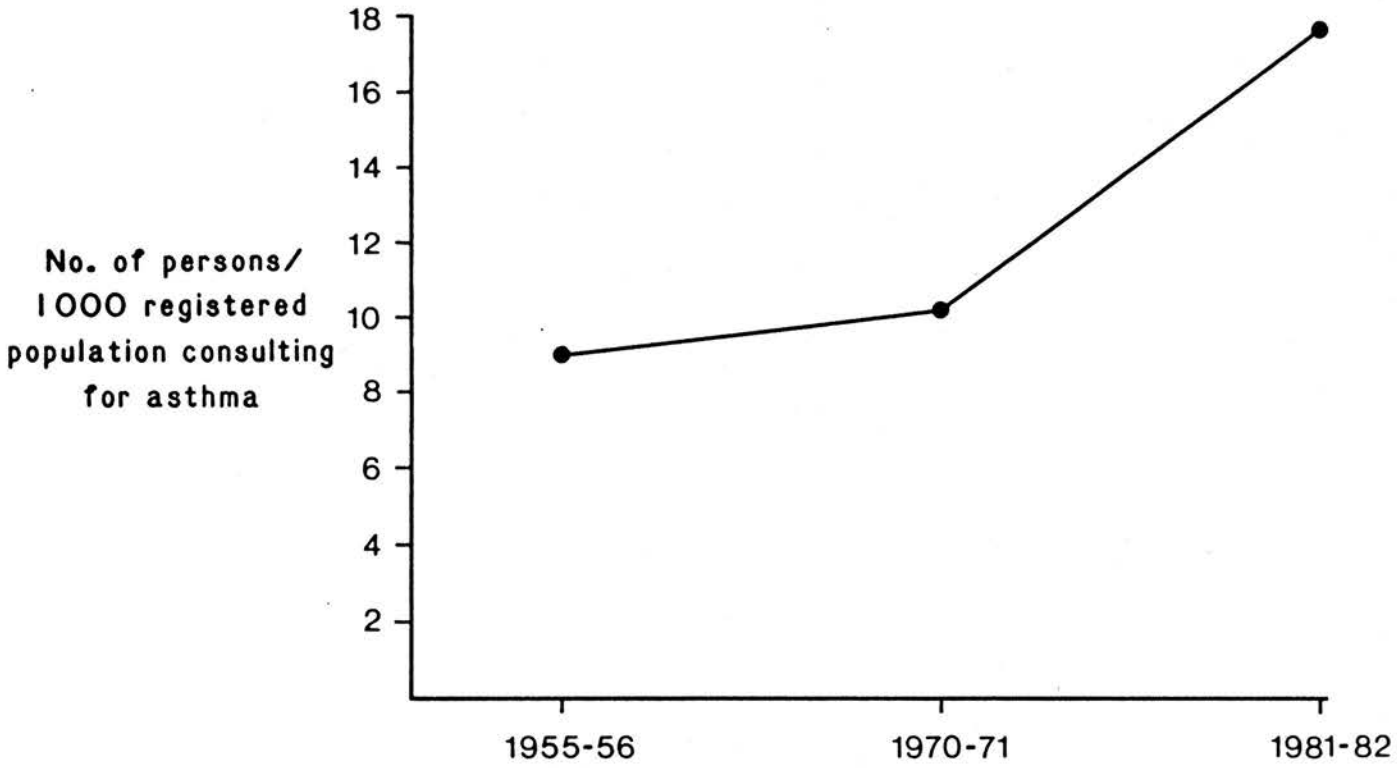
The epidemiological study of asthma has been hampered by a lack of agreement on its definition (Gross, 1980). British physicians have stopped short of using the American Thoracic Society's definition (1962), which includes reference to the presence of bronchial hyperreactivity as a cardinal feature and concentrate rather on clinical evidence of variability in airflow obstruction as the main characteristic (Scadding, 1977). Ideally this should be recorded objectively by spirometry or peak flow rate measurement, but, particularly in general practice this may not always be feasible.

With this caveat in mind, recent evidence has been presented (Fleming, 1987) suggesting, in common with anecdotal accounts (Morrison - Smith, 1979), that the prevalence of asthma is increasing. National morbidity surveys have been carried out in general practice in 1955-56, 1970-71 and 1981-82. These latter two surveys covered a population of 300,000, with 19 practices participating in both, and a further 31 in 1970-71 only and 27 in 1981-82 only. Patients and consultations for specified conditions including asthma were recorded throughout each year.

Comparison of the 1970-71 and 1981-82 figures shows an approximate doubling of the annual prevalence of asthma in both males and females (Table 1). By comparing the number of people diagnosed as suffering exclusively from asthma, hayfever, acute and chronic bronchitis it can be seen that there were

FIGURE 1: CHANGES IN NUMBERS OF PATIENTS CONSULTING FOR ASTHMA

(from Fleming 1987)



increases in the numbers with asthma and hayfever, while figures for acute bronchitis increased slightly and those for chronic bronchitis fell. Separate analysis of the results from the 19 practices participating in both surveys, minimising confounding variations in topography, weather and population characteristics showed close agreement with the total survey data.

The authors' remark on the decline in chronic bronchitis which they have seen in their own clinical practice, and whilst it remains possible that some patients previously considered to have exclusively chronic bronchitis are now considered to have exclusively asthma (and not some combination of both) even such a major swing would not account for the increase in numbers with asthma. The authors, therefore, conclude that the increase in asthma prevalence is not simply due to a change in diagnostic preference by practitioners.

This work, taken with the original 1955-56 morbidity survey, which found an annual period prevalence of asthma of 8.5/1,000 registered population, therefore, shows a continuing upward trend, (Figure 1) to 20.0/1,000 per males and 15.9/1,000 per females.

Other evidence also suggests that morbidity from asthma is increasing. There are upward trends in the sales of inhaled B agonists, steroids and sodium cromoglycate in the UK (Table 2) (Keating, 1984).

TABLE 2

PERCENTAGE INCREASE IN SALES OF ASTHMA DRUGS IN THE UK 1977-81 (AFTER KEATING, 1984)

| | |
|---|---|
| Sympathomimetic Aerosols | 42% |
| Corticosteroid Aerosols | 69% |
| Sodium Cromoglycate | 20% |
| Oral Theophyllines | 30% |

TABLE 3

INCREASE IN HOSPITAL ADMISSIONS FOR ASTHMA
(FROM NATIONAL MORBIDITY SURVEYS, FLEMING, 1987)

| | 1970-1 | 1981-2 | Increase from 1970/1 to 1981/2 |
|---|---|---|---|
| Total number of referrals for hospital based care | 186 | 292 | 106 |
| Referrals for emergency admission (a subset of the total) | 75 | 160 | 85 |

TABLE 4

CHANGES IN ICD CODING, RELATING TO THE CLASSIFICATION OF ASTHMA DEATHS

| Revision | Period | Condition Named on Death Certificate | ICD Code to Which Death Assigned |
|---|---|---|---|
| 7th | 1958-67 | Asthma, not allergic with mention of acute bronchitis | Bronchitis |
| 8th | 1968-78 | Asthma, not allergic with mention of bronchitis (acute or chronic)<br>Bronchiolitis<br>Emphysema | Bronchitis<br>Bronchiolitis<br>Emphysema |
| 9th | 1979- | Asthma, any form, even if mention of bronchitis etc. | Asthma |

In England and Wales hospital discharge rates for asthma have increased from 6.8 per 10,000 in 1975 to 11.2 per 10,000 in 1981 (DHSS/OPCS 1974-83). In the national morbidity surveys already described the increase in referrals to hospital (excluding self referrals) was almost entirely due to an increase for emergency admission (Table 3). Social Security claims for absence from work due to asthma have doubled from 1968 to 1982 (Ayres, 1986).

Finally and perhaps most significantly, this increase in various parameters measuring asthma morbidity has been associated with an upward trend in asthma mortality in this country.

Asthma mortality rates for 15 - 44 year olds over the past thirty years are shown in Figure 2 overleaf. The International Classification of Diseases (ICD) has been revised three times during this period so that deaths due to asthma, where bronchitis is also mentioned, are now attributed to asthma (Table 4).

The effect of these changes can be judged from the Office of Population, Censuses and Surveys (OPCS) bridge coding, whereby in 1967, before the introduction of the 8th revision of ICD and in 1978, before the introduction of the 9th revision, death certificates were coded by both outgoing and incoming revision rules (Table 5 overleaf) (Stewart, 1985).

As can be seen, this change in coding has only a minimal effect in young adults (Figure 3).


FIGURE 2: Deaths from asthma per million population of England and Wales in males and females aged 15–44 years from 1958 to 1982

TABLE 5

BRIDGE CODINGS IN TRANSITION YEARS TO SHOW THE EFFECT OF ICD REVISIONS (STEWART, 1985)

| Age (years) | Death assigned to asthma | | | | | |
|---|---|---|---|---|---|---|
| | in 1967* | | | 1978+ | | |
| | 7th rev. | 8th rev. | % change | 7th rev. | 8th rev. | % change |
| 0-14 | 117 | 117 | -0 | 10 | 13 | (+30) |
| 15-44 | 441 | 420 | -5 | 64 | 68 | + 6 |
| 45-64 | 664 | 619 | -7 | 99 | 132 | +33 |
| >65 | 535 | 488 | -9 | 140 | 188 | +34 |
| All ages | 1,757 | 1,644 | -6 | 313 | 401 | +28 |

* all asthma deaths.

+ 25% sample of asthma deaths.

Parentheses indicate percentage based on small number of observations.

**FIGURE 3: EFFECT ON CHANGES IN ICD CODING ON STANDARDISED ASTHMA MORTALITY RATIOS IN DIFFERENT AGE GROUPS**
(from Burney 1986)

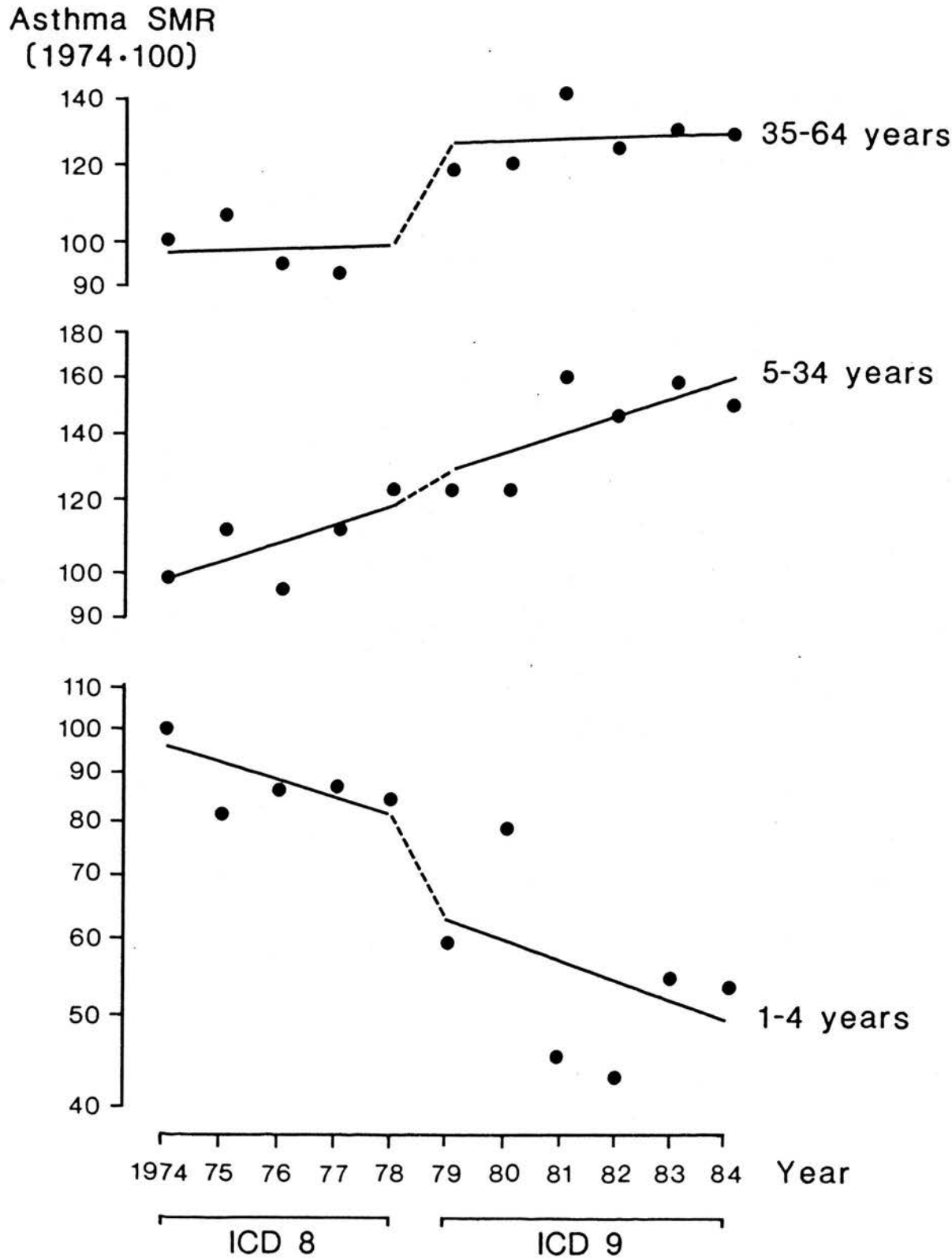


TABLE 6

ACCURACY OF DEATH CERTIFICATION
(1979 BTA ENQUIRY, FROM STEWART, 1985)

| Age (years) | Panel assessed as deaths from asthma | Correctly coded from death certificate information | |
|---|---|---|---|
| | Number | Number | % |
| 15-44 | 37 | 36 | 97 |
| 45-54 | 21 | 19 | 90 |
| 55-64 | 31 | 22 | 71 |
| TOTAL | 89 | 77 | 87 |

A further factor which influences mortality rates is the accuracy of death certification. This was assessed in the initial stages of a survey of asthma deaths performed by the British Thoracic Association (1982). A total of 153 certificates containing the word asthma were forwarded to these investigators, of which 101 would have been coded by the 9th revision of ICD as asthma deaths. Detailed case note review and interviews with attending practitioners and close relatives of the deceased resulted in the panel deciding unanimously that death was due to asthma in 89 of these cases (88%). Again analysis by age showed the smallest error in certifications to occur in young adults (Table 6).

Bearing in mind the effects of changes in ICD coding and the accuracy of death certification, Burney's (1986) analysis of asthma mortality rates shows an increase (see Figure 2) which is due particularly to an increased mortality rate in 5 - 34 year old males (Table 7 and Figure 4 overleaf). Concern over increasing asthma mortality rates has also come from New Zealand (Jackson, 1982) and the United States (Sly, 1984) suggesting that this may be a more widespread phenomenon (see later).

**FIGURE 4: STANDARDISED MORTALITY RATIOS FOR ASTHMA IN 5 – 35 YEAR OLD MALES AND FEMALES**
(from Burney 1986)

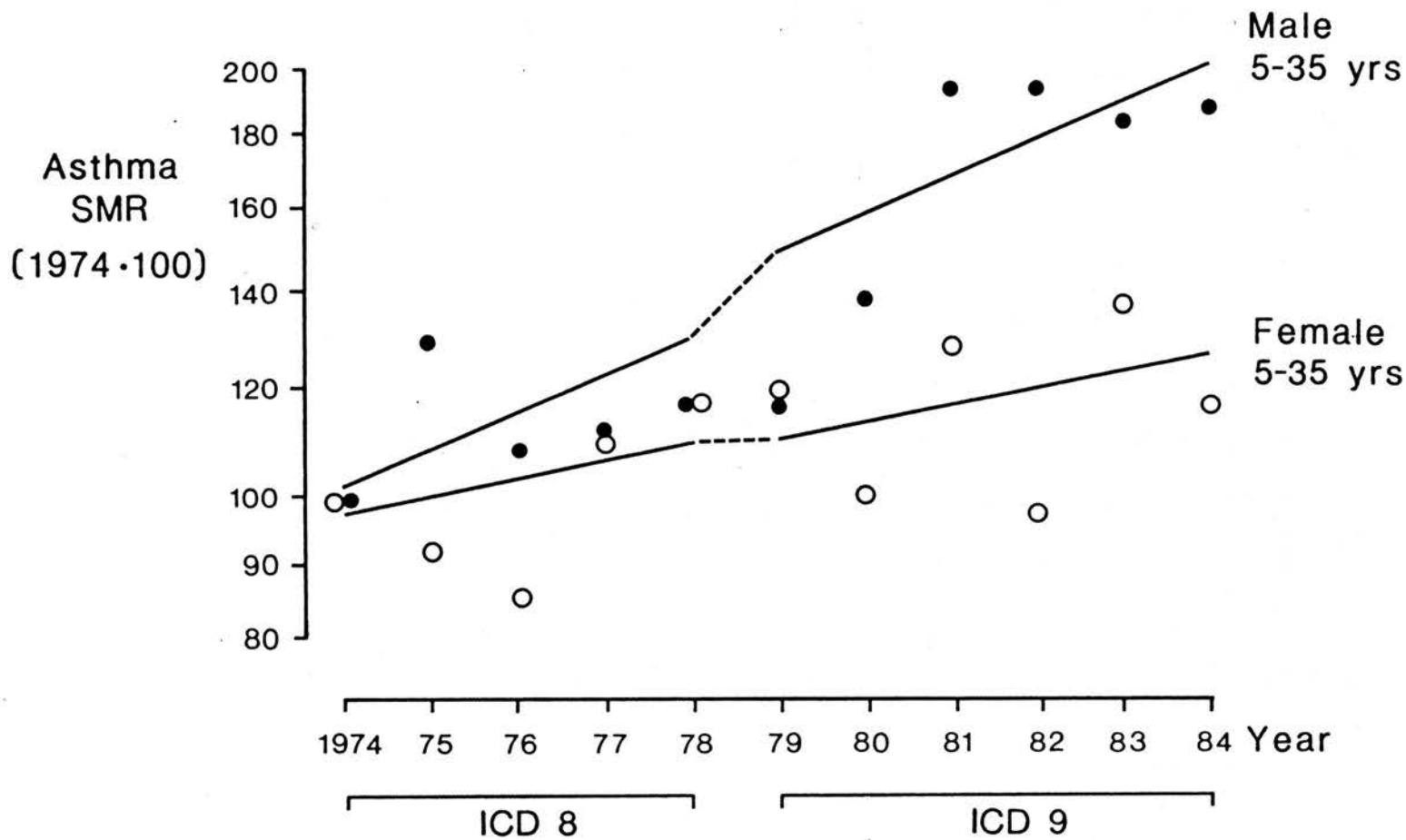


TABLE 7

ASTHMA DEATH RATE PER MILLION POPULATION AND STANDARDISED MORTALITY RATES FOR ASTHMA IN ENGLAND AND WALES (BURNEY, 1986)

| Year | Males | | | Females | | |
|---|---|---|---|---|---|---|
| | 1-4yrs | 5-34yrs | 35-64yrs | 1-4yrs | 5-34yrs | 35-64yrs |
| Death rates/$10^6$ | | | | | | |
| 1974* | 4.6 | 5.3 | 22.1 | 8.4 | 5.2 | 30.3 |
| 1979 | 1.7 | 6.8 | 28.0 | 6.2 | 6.7 | 33.7 |
| 1984 | 3.9 | 10.5 | 33.4 | 3.3 | 6.6 | 34.0 |
| SMR's | | | | | | |
| 1974* | 100 | 100 | 100 | 100 | 100 | 100 |
| 1979 | 36 | 122 | 128 | 74 | 124 | 112 |
| 1984 | 84 | 186 | 152 | 39 | 116 | 115 |

* ICD 8th revision, all other figures ICD 9th revision.

(ii) Preventable factors shown in most asthma deaths

Several surveys of deaths from asthma have been reported in the past decade in the United Kingdom. In these the circumstances of over 400 deaths from asthma have been investigated.

Cochrane and Clark (1975) identified 21 deaths in hospitals in Greater London and reviewed the treatment given. They found that in seven of these cases corticosteroids had either not been used or given in only minimal doses; that in at least half of all cases objective assessment of airflow resistance or measurement of arterial gas tensions were not performed and finally that a majority (70%) both of this group and a further group of 19 survivors of an acute asthma admission had been treated with sedatives.

Macdonald (1976a) investigated 53 hospital deaths in Cardiff. He confirmed the above findings on the underuse of corticosteroids, measurement of peak flow rates or blood gases and commented on a tendency for doctors and patients to underestimate the severity of the fatal attack.

In a further study of 90 deaths in the community (Macdonald, 1976b) the fatal attack occurred in patients with a long history of asthma (mean 16 years). 92% had had previous hospital admissions with severe asthma and 21% had been in hospital within two months of death. Although in that group the fatal attack was typically shortlived, Arnold (1982) assessed the speed of onset of asthma attacks in 26 surviving cases and showed no relationship with severity of the full developed episode.

Bellamy (1979) assessed previous asthma symptoms in 44 acute asthma admissions to hospital and found that patients had poorly controlled wheeze for an average of five weeks before admission, which was finally precipitated by more rapid deterioration. These findings suggest that a proportion of Macdonald's cases (1976b) may have had longstanding poor asthma control.

Ormerod (1980) reviewed 38 deaths outside hospital and 15 in inpatients in Birmingham. In the community cases, 60% had previously been admitted to hospital and 16% died within three weeks of discharge. 37% saw their practitioners early in the fatal attack but in no case was a significant change in therapy made. In the final stages under-treatment persisted and arrangements for hospital admission were made for only two of 11 patients alive when the practitioner arrived.

The 15 hospital deaths also occurred predominantly in patients with longstanding asthma. Most (13) had had previous admissions. Their initial pulse rates were in the range 88-120/minute. Two had peak flow rate and four arterial gases measured initially but in no case was this subsequently monitored.

As already mentioned, the British Thoracic Association (1982) reviewed the circumstances of 90 deaths from asthma in the West Midlands and Mersey regions in 1979. All but eight of these cases had had asthma for at least five years and 58 (65%) had a previous hospital admission for acute asthma, 19 within the last year of life. Thirty eight patients (42%) were under forty five

years of age and 62 (69%) were taking corticosteroids regularly in some form. Detailed review of patient and treatment characteristics led the panel of three physicians to judge that 53% of patients were not fully co-operative in their management, that patients, their relatives and doctors often failed to recognise the severity of asthma with delay in starting appropriate treatment and that corticosteroids and bronchodilators were underused. In all, preventable factors were thought to have contributed to 86% of these deaths.

Cochrane (1975) had noted a significant excess of deaths occurring in the early morning. This was not confirmed in the Cardiff (Macdonald 1976a) or Birmingham (Ormerod, 1980) series suggesting a possible link with the high proportion of his cases who were receiving sedatives. However, in a later analysis of sudden deaths of asthmatics in hospital (Hetzel, 1977) a majority occurred between midnight and six a.m. Whilst admission tachycardia, the presence of over 20 mm Hg of pulsus paradoxus, low peak flow rate or hypokalaemia failed to predict these patients, in all cases abnormally large swings in diurnal peak flow variation (>50%) were seen. Such a degree of variability of peak flow rate was seen in 30% of all cases, but nevertheless correlated strongly with the risk of ventilatory arrest and sudden death.

Thus regular recording of peak flow rate not only provides objective assessment of response to treatment, but it can also alert the physician to the profound degree of airflow obstruction which some patients experience in the early morning, which places them at great risk.

The recent new epidemic of asthma deaths in New Zealand (Jackson, 1982) prompted the establishment of an MRC Asthma Task Force in Auckland (Sears, 1986). Study of 147 asthma deaths there in parallel with the BTA investigation confirmed all the preventable factors described by the BTA to be present in Auckland, although there was a higher rate of non-preventable deaths in New Zealand, suggesting a greater severity of asthma there.

A subsequent case control study (Rea, 1986) has also been reported. Hospital and community controls for 44 acute asthma death cases under the age of sixty were found. The cases were more likely than community controls to have severe disease (relative risk 4.1), a hospital admission (relative risk 16.0) or visit to an emergency department within the previous year (relative risk 8.5). Only two factors, however, distinguished those who died from surviving hospital controls. These were the occurrence of previous attacks of life threatening asthma (defined as attacks with disturbance of conscious level or raised $pCO_2$) (relative risk 3.8) or the existence of psychosocial problems (relative risk 3.5). This term was used to describe recent bereavement or unemployment, or evidence of alcoholism, personality disorder or depression described in the case notes.

In all other measures of severity of attack, treatment and supervision, cases dying and hospital controls were similar.

A further retrospective analysis of hospital deaths from asthma (Eason, 1987) in which controls were matched for age, sex and admitting hospital, but not severity of asthma has recently been reported. Again defects in management, as far as these can be judged in a retrospective study were identified not only in 83% (29/35) cases but also in 40% (14/35) of controls.

Thus every survey of asthma deaths reported over the past twelve years (1975 - 1987) has identified preventable factors to have contributed to many of these deaths. Both patients and their doctors have been shown to underestimate the severity of asthma, with under-treatment preceding death. That the latest of these surveys (Eason, 1987) shows little improvement to have occurred despite the widespread coverage these articles have received (Editorials in Thorax, 1978; Lancet, 1979; BMJ, 1979) is highly disturbing.

(iii) Other evidence of underdiagnosis and under treatment of asthma

Many workers have highlighted the common occurrence of wheeze in childhood, with increased recognition that the differentiation of wheezy bronchitis from asthma is spurious (Williams, 1969).

In a sample of 284 nine year old Croydon school children, a third of those with disturbed nights or restricted activity due to wheeze had taken no anti-asthma drugs in the past month (Anderson, 1981). Both this and another survey of 7 year old school children (Lee, 1983) showed a cumulative prevalence of asthma or episodic wheeze of 11%. Speight (1983) assessed 179 school children who had had at least one episode of wheeze in the preceding two years, since school entry. All but 14 had seen their general practitioners, but a diagnosis of asthma had been made in only 21. Bronchodilators had seldom been given in the absence of such a diagnosis. This study found that use of the word asthma with explanations and effective treatment led to parental relief, and not anxiety.

A later survey of childhood asthma in a single practice (Levy, 1984) also found a prevalence of 11%. These authors, however, noted that in half of the cases, at least 16 attendances with respiratory symptoms occurred before such a diagnosis was made.

Comparable cross-sectional surveys of adults with asthma are more difficult to perform. As the prelude to assessment of a specified management plan in a practice population of 13,000 (Modell, 1983) 115/170 asthmatics identified from the practice disease register as having current asthma were assessed. Sixty eight of these were over fifteen years old. Fifty six per cent of this subgroup of adult asthmatics had respiratory symptoms at least once per week, 44% had a single random peak flow recording more than four standard deviations from their predicted normal and 33% had had more than five units of disability in the past four months. (One unit of disability = half-day spent in bed or chair, one day lost from usual activity or two days of reduced activity). All these findings indicate the substantial burden that asthma can impose.

(iv) Doctors' and patients' understanding of asthma

One of the preventable factors cited in the previous discussion of asthma deaths was the tendency of both doctors and patients to underestimate the severity of asthma, and to under-react.

The views of both doctors and patients on various aspects of asthma management have been examined. In general they confirm the above impression.

Henry (1983) compared the responses to 25 questions on the management of childhood asthma of 26 paediatricians and 21 physicians with an interest in chest medicine. These questions aimed to explore specialist practice rather than text book knowledge and reflected the questions that parents often ask. There were considerable differences in opinion for over half of the questions. The authors' comment on the problem that parents and general practitioners face when given different advice from several different sources.

Marks (1983), using a series of ten statements about asthma, asked 78 general practitioners and 7 consultants with an interest in childhood asthma to express agreement or disagreement on a scale of 0 - 7. Age, practice characteristics and teaching commitments of the practitioners were also obtained. There was significant disagreement between these two groups of doctors on nine of the ten statements. Trainers and practitioners teaching medical students regularly showed fewer disagreements than other practitioners. The chief areas of disagreement suggested that a sizeable minority of practitioners were unaware of the

TABLE 8

CHARACTERISTICS OF ASTHMA CLINIC PATIENTS SURVEYED FOR UNDERSTANDING OF THEIR CONDITION (ELLIS, 1985)
n = 50

| | | |
|---|---|---|
| Average age | (years) | 42.8 |
| Age range | " | 19-80 |
| M:F | | 1:1.3 |
| Average length of history | " | 17.9 |
| Range | " | 1-40 |
| Clinic attendance | " | 7.4 |
| Range | " | 0.5-18 |
| Exacerbations in past year | | |
| average no./person | | 10.4 |
| Range | | 0-36* |
| Commonest treatment | | |
| Aerosol bronchodilator | | 98% |
| Aerosol steroid | | 70% |
| Oral steroid | | 64% |

* 8 patients admitted at least once with acute asthma.

less stereotyped ways in which childhood asthma may present and were pre-occupied with recurrent respiratory tract infection and its treatment. Both of these conclusions were echoed by Levy (1984).

Patients too have been shown to have widely disparate views of their condition often despite well-intentioned attempts to inform them.

50 chronic asthmatics in Aberdeen (Ellis, 1985) were questioned on their reactions to an attack of asthma, awareness of the potential seriousness of their condition, knowledge and use of drugs. Their characteristics (Table 8) show them to have severe disease. Nevertheless they were ill-informed and complacent. 34% never sought medical help during any attack and only 20% recalled ever being given advice on what to do if an exacerbation of symptoms occurred.

During a moderate to severe attack, 72% would delay seeking help for at least forty eight hours, even if current therapy were ineffective, a reluctance to call out their practitioner at night forming an important element of this.

Most patients did not recognise the serious prognostic implications of certain features of their disease, notably the occurrence of nocturnal symptoms and 28% did not believe that anyone ever died of asthma. These findings were confirmed by another Highland study (Franklin, 1987).

Attempts at improving patient awareness and self management skills in the UK have met with little documented success. Hilton (1986a) reported the results of a controlled evaluation of the effect of patient education on asthma morbidity. Three groups of asthmatics (a control group and groups receiving a limited and maximum education programme) were assessed by means of a questionnaire. There was a significant improvement in knowledge only in the group receiving the maximum education programme but neither of the two "educated" groups showed any difference in self management skills or asthma morbidity compared with the control group.

Modell (1983), in the previously mentioned assessment of a management plan concentrated on discussion, explanation and education of asthmatics in a single general practice. A research assistant interviewed 92 asthmatics beforehand and a year later. Despite recorded adherence to the management plan by all attending practitioners many patients (42%) still felt they did not know enough about asthma, or thought the doctors' explanation was inadequate (48%). Many (32%) were not taking treatment as advised. Some improvement in the indices of asthma morbidity recorded was seen, namely a reduction in the number of disability days (see earlier definition) in the past four months, an increased proportion of patients with a random peak flow measurement in the normal range and a reduction in the proportion with asthma symptoms more than once weekly. Nevertheless major discrepancies between the doctors (often intuitive) assessment and that of the researcher who spent over an hour with each patient suggested that such underestimation of severity of

disease by practitioners remained a major bar to the proper use of available therapy.

More intensive health education programmes, often administered by professionals and aimed at more severely affected asthmatics have been shown to produce improvements in morbidity and self management skills in the United States (Fireman, 1981; Maiman, 1983). These have tended to use behavioural techniques, teaching a new response to an old problem rather than aiming to improve knowledge in a diffuse way, suggesting that this may be a more useful technique (Hilton, 1986b).

(v) Conclusions

All the available evidence, therefore, suggests that asthma, a common condition, is increasing in prevalence and the associated mortality may be rising in parallel. Sales of most of the drugs commonly used to treat asthma are also rising in the UK. Nevertheless, unnecessary deaths continue to occur and, at least in children, preventable morbidity has been documented.

All the literature on deaths from asthma is retrospective, and may not reflect on other cases of asthma who survive. For these two reasons a prospective survey of hospital management of acute asthma was carried out, and linked with measures of outcome to enable objective conclusions to be made.

A large scale survey of current asthma management in general practice was also performed as a prelude to the introduction of a programme of advice and information for practitioners, and to a lesser extent, for patients.

## CHAPTER 2 - A RETROSPECTIVE SURVEY OF HOSPITAL ASTHMA MANAGEMENT


### SUMMARY

A retrospective survey of asthma admissions to general medical units during 1983 was made. One hundred and twenty seven cases occurred, of whom 52 were males (44%). The average age was 45.2 years. Forty eight per cent were receiving inhaled steroids or cromoglycate before admission and 16% regular oral steroids. Initial assessment seldom included peak flow measurement although these were made subsequently in 57%. No steroids were used in 32% of cases. No oxygen was given in 48% of cases and when used was usually at low flow rates. Apart from a reducing course of steroids, 46% of cases were discharged with no increase in pre-admission maintenance treatment and although follow-up was planned for 76% it was for an average 4.9 weeks later. This survey suggested widespread under-treatment and under-supervision of asthma patients admitted to acute general medical wards, similar to the findings of surveys of asthma deaths.


### INTRODUCTION

As discussed in the previous chapter, asthma is increasingly common, and the associated mortality, particularly in young men is also rising. Preventable factors have been shown to contribute to many deaths.

Mortality from asthma probably represents the tip of an iceberg of morbidity, which is more difficult to measure. Patients with acute asthma are in an unstable phase of their disease and are a high risk group. To investigate how their management conformed to accepted standards, a pilot retrospective survey of asthma admissions to a single teaching hospital in 1983 was made.

## METHOD AND PATIENTS

Glasgow Royal Infirmary provides acute medical services to the east end of Glasgow, with a catchment population of 190,000. Four medical units receive emergencies for twenty four hour periods by rotation, a majority of the patients being admitted initially to an acute receiving ward. The case notes of all patients admitted in 1983, for whom a diagnosis of asthma was recorded on the discharge code were scrutinised. All recorded details of each patient's age, sex and past history were extracted from the notes using a checklist. Details of assessment on admission, initial treatment and subsequent supervision, both in hospital and after discharge were also collated.

Results are given as percentages of number of episodes or patients, as appropriate, and statistical analysis was by Chi square testing, with Yates correction for continuous variables.

## RESULTS

The discharge coding identified 165 admissions, but only 127 of these proved on closer scrutiny to have been admissions primarily for deteriorating asthma. Of the remaining 38 cases who were excluded from subsequent analysis; 21 had quiescent or co-incidental asthma, or no evidence at all of asthma; 11 cases had been transferred shortly after admission to a specialised chest unit at an adjacent hospital; three records were untraceable and three died. None of these deaths was due to acute asthma; one occurred in an elderly man in Type II respiratory failure with no previous history of asthma, one in a patient treated initially for asthma but found at bronchoscopy to have tracheal obstruction by a central tumour, and the third in an asthmatic patient who developed abdominal sepsis after a routine cholecystectomy.

### 1 Demographic and Other Descriptive Data

The 127 admissions occurred in 118 patients, 110 patients having one admission, seven patients two admissions and one patient three admissions within the year. There were 52 males (44%). The age range was from 14 - 80 years, mean 45.2 years, median 51 - 60 years. Forty eight (40%) patients were described as having had asthma since childhood, 54 (46%) late onset asthma and this was a new diagnosis on admission in 12 patients (10%). Duration of asthma was not specified in five patients. At the time of admission 61 cases were lifelong non-smokers (48%), 36 (28%) current smokers and 23 (18%) ex-smokers. No record of smoking history was made in seven cases (6%).

TABLE 9

REASON FOR DETERIORATION AND ADMISSION TO HOSPITAL

| REASON | No. | (%) |
|---|---|---|
| None identified | 54 | (42) |
| Viral illness/URTI | 15 | (12) |
| Chest infection | 24 | (19) |
| Reduction in steroids | 3 | (2) |
| Poor compliance | 7 | (6) |
| Investigation/assessment of respiratory symptoms | 5 | (12) |
| Other | 9 | (7) |

In 61 (48%) cases inhaled steroids or cromoglycate were being taken before admission. Twenty (16%) cases were receiving regular oral steroids before admission but of these only two were also taking inhaled steroids, cromoglycate or both.

There was no apparent cause for deterioration found in 54 cases (42%). Viral illness or upper respiratory tract infection (15 cases) and chest infection (24 cases) were the commonest cited quoted cause (30% together). Other reasons for admission are shown in Table 9. The mean length of stay in hospital was 5.8 days.

2 Initial Assessment and Treatment

Pulse and respiratory rate were always recorded, together with blood pressure, when first seen. The pulse rate was over 110 bpm in 57 cases (45%) although respiratory rate was recorded at over 30 per minute in only 31 (24%) of cases. Pulsus paradoxus was looked for in 21 cases (16%), and was present in 12 of these. Peak flow rate was recorded on admission in 11 cases (9%). Every record had a comment on cyanosis. It was said to be present in 33 cases (25%). Blood gas analysis was performed on admission in 55 cases (43%), the $pO_2$ being less than 60 mmHg in 19 of these cases. However, the inspired $O_2$ concentration was seldom quoted in conjunction with blood $O_2$ tension, so that it was impossible to evaluate most of the results.

Forty eight (38%) cases were treated with intravenous steroids and 80 (63%) with oral steroids, 39 receiving both of these. IV aminophylline was given in 50 cases (39%) so that overall 32 cases (25%) received all three treatments. Thirty six cases (28%) received none of these three forms of treatment. Nebulised bronchodilator, given in every case, is the standard form of immediate treatment in this hospital, often as the patient is initially assessed. Oxygen was recorded as having been given in 66 cases (52%) and of these only 19 received 35% or higher concentration $O_2$. Intravenous fluids were given to 10 (8%). There was significant correlation ($X^2 = 170.14, p < 0.01$) between admission pulse rate and increasing intensity of treatment given (oral, iv steroid $\pm$ aminophylline), such that those with the highest pulse rates were most likely to receive all three modalities, and those with lowest pulse rates least likely.

3 Supervision in Hospital and After Discharge

After admission to the wards regular peak flow recordings, usually before and after bronchodilator were made in 72 cases (57%) and a comment was made on the adequacy of inhaler technique in 27 (21%). Thirty three cases had blood gas analysis performed after admission (compared with 55 in admission and 66 given $O_2$) and 40 (31%) had full pulmonary function tests performed. There was no correlation between admission pulse rate and increasing level of supervision as judged by these parameters. Of 80 given oral steroids, all but three were discharged on these (60% of all cases). In 54, instructions to reduce and withdraw steroids were adequately detailed in the case

TABLE 10

LONG TERM CHANGE IN TREATMENT AFTER DISCHARGE

| TREATMENT AFTER DISCHARGE | No. | (%) |
|---|---|---|
| No change | 50 | (40) |
| Reduction | 9 | (7) |
| Increase inhaled steroid or DSCG | 53 | (42) |
| Increase regular oral treatment (steroid or bronchodilator) | 3 | (2) |
| Increase both inhaled and oral treatment | 12 | (9) |

notes, in nine this was not mentioned and 14 had been instructed to maintain steroids until reviewed as outpatients. Apart from a reducing course of steroids, longer term changes in treatment were made in 70 cases (61%), as shown in Table 10. Arrangements for follow-up were made in 97 cases (76%), most patients being referred to or followed-up at a respiratory clinic (78/97, 80%), with appointments planned for a mean of 4.9 weeks later.

## DISCUSSION

This study describes the population of asthmatics treated in a single general hospital over the period of one year. It shows the range of severity of asthma and of treatment given. The population described is similar in many respects to that of the BTA report on asthma deaths (1982). (BTA report 43.7% males against 45% in this study; BTA group 42% under 45 years, mean age 45.2 years here; BTA group 68.9% taking oral or inhaled steroids or DSCG, this series 62%.)

Bearing in mind the limitations of retrospectively acquired data, factual elements liable to have been recorded in all cases were emphasised. The accuracy of this data was maximised by the crosschecking of medical information with drug prescription cards and nursing notes. The small number of cases seen in one year, although similar to that reported by others, (Crompton, 1979) may reflect a tendency for asthma in adults, especially but not exclusively if smokers, to be diagnosed as obstructive airways disease (Dodge, 1980 and 1986).

The obverse of many of these findings is as important as the data as presented. In over 90% of admissions no objective assessment of airflow obstruction was made before treatment was started, echoing the findings of other workers (Reed, 1985).
Fifty seven per cent had subsequent PEFR recordings made; on what basis the assessment of improvement of the remaining 43% was made is not clear, particularly when this is liable to have involved several individuals over a period of time. It was not possible in a retrospective survey to make a clinical assessment of severity of asthma (Jones, 1971), which has however been shown to correlate well with objective parameters including pulse rate (Arnold, 1982). This being the case it is noteworthy that there was a significant correlation between admission pulse rate and increasing intensity of treatment, but other findings suggest that treatment was suboptimal.

Sixty eight per cent of patients were treated with some form of steroids in addition to bronchodilators, leaving 32% with asthma sufficiently severe to require inpatient treatment but not with this most effective form of treatment. Although Luksza (1982) suggested that giving steroids did not influence the rate of recovery from an acute attack of asthma it is standard respiratory practice (Clark, 1983). Corticosteroids are potent anti-inflammatory agents and also restore B adrenergic receptor responsiveness (Ellul Micallef, 1975; Shenfield, 1975), thus improving the bronchodilator effect of inhaled B agonists. Most respiratory physicians would agree with Grant's view (1982) that to withhold such treatment can be dangerous.

Half of all cases were treated with oxygen and when this was given it was used at low concentration, inappropriate in acute asthma, and often not monitored by subsequent blood gas analysis.

In forty six per cent no provision was made for an increased level of maintenance therapy. Follow-up was planned, rather than definitely arranged, for most (76%) but not until five weeks later on average, despite the fact that the period immediately after hospital discharge can be an unstable and dangerous one for the asthmatic (Macdonald, 1976(b); Ormerod, 1980).

This pilot study, therefore, showed that the management of a proportion of asthmatics may have differed from standard respiratory practice and confirmed that further investigation was worthwhile.

In particular it was necessary to be certain firstly that all admissions for acute asthma had been included and secondly that some assessment of outcome was made, so that any differences in management could be objectively assessed.

## CHAPTER 3 - PROSPECTIVE SURVEY OF ACUTE ASTHMA MANAGEMENT IN HOSPITAL


### SUMMARY

One hundred and fifty seven (81%) acute asthma admissions to a single hospital over a calendar year were surveyed prospectively by interviewing patients at home on average 13 ± 6.4 days after discharge and by reviewing their case records for details of hospital management.

Significant proportions of cases were poorly controlled at interview with 34% reporting regular sleep disturbance due to wheeze, 50% morning chest tightness and 49% wheeze climbing one flight of stairs.

On admission patients were described as having symptoms of deteriorating asthma for a median three days. Closer questioning of half of the cases (n=71), however, revealed that 70% had had regular symptoms of poor asthma control for weeks or months.

The findings, therefore, that only 73% were treated with oral corticosteroids, that 47% had regular maintenance therapy increased at the time of discharge and that review was planned for 68% on average 3.5 ± 2 weeks later suggest that under-supervision and under-treatment of asthmatics is not confined to cases dying from asthma.

## INTRODUCTION

The pilot survey of hospital asthma management described in Chapter 2 suggested that under-treatment and under-supervision of asthmatics was occurring in a proportion of cases, and may not be confined to patients dying of their disease (BTA, 1982 and others). A prospective survey of all acute asthma admissions was therefore undertaken, with patients being seen at home shortly after discharge, so that their progress following the index attack could be monitored.

## METHOD

With the support of the hospital's medical division, all cases of acute asthma, and episodes of wheezing illness in non smokers were identified from day to day by close liaison with the medical and nursing staff of the admitting wards. Four medical units in the hospital receive emergencies by rotation. Patients reported by the admitting firm to belong to these two categories were then invited to take part in the survey, the nature of which was described. Arrangements were made to visit participating subjects at home approximately two weeks after discharge. The patients' general practitioners' agreement was obtained at this stage. In the patient's home, a checklist of some 40 items (see Appendix 1) was completed in a semi-structured interview. This provided a detailed description of each patient's asthma history and previous treatment; of events leading up to the hospital admission; management in hospital and immediately after discharge; of current symptoms of asthma; understanding of their condition and associated drug therapy. This interview usually took between 20 and 30 minutes. After an interval of approximately two months, the patients' case notes

were then reviewed and details of assessment of asthma severity, management and supervision culled from them.

All this information was stored on a VAX-VMS mainframe computer and further data analysis made using SPSS-X.

## RESULTS

### (1) Exclusions

One hundred and ninety four cases were enrolled in the study. One hundred and fifty seven cases were followed up as described, giving an overall follow-up rate of 81%.

The 37 cases not followed up as described were accounted for as follows. Three deaths occurred (2 males) in patients with an average age of 66 years. Nine cases were transferred within 24 hours to an adjacent chest unit and were not included because most of their management was undertaken there. (However, a further 12 cases who were transferred to the same unit an average of five days after admission were followed up and included in the analysis below.) Nine patients were not seen at home as arranged and failed to respond to subsequent telephone call or letter. Four patients from outwith Glasgow were not contacted. Three patients were re-admitted to other hospitals before interview and six admissions occurred in two vagrants, often largely for social reasons. Finally, there were three cases where follow-up was not possible or inappropriate for medical reasons; in one case the general practioner refused permission for follow-up, in another the patient was confused with co-existing cerebrovascular disease and a third was transferred to long term geriatric care.

TABLE 11

BASIS OF DIAGNOSIS OF ASTHMA

| | | |
|---|---|---|
| Clear history + objective evidence of reversible airflow obstruction | 77 | (49%) |
| Clear history only, lifelong non smokers | 38 | (24%) |
| Doubtful history, but previous +ve steroid trial and evidence of reversible airflow obstruction | 20 | (13%) |
| Doubtful history only | 18 | (11%) |
| Notes not available | 5 | (3%) |

(2) General Details of History

One hundred and fifty seven admissions occurring in 139 patients over a full calendar year were investigated. Sixteen patients had two admissions and one had three admissions. The average age ($\pm$ one standard deviation) of the patients was 47.9 $\pm$ 19.9 years. Seventy per cent were non smokers (lifelong non smokers 41%, ex smokers 29%), 30% current smokers.

Survey of the entire hospital record of the patients, augmented where appropriate by review of their asthma clinic attendance records shows the basis on which the diagnosis of asthma was made (Table 11). Thus 62% had objective evidence of reversible airflow obstruction from these records, a further 24% a clear history of episodic wheeze typical of asthma, and only 11% a doubtful history of wheeze and no confirmatory lung function results. Six patients who had been found at this stage of the investigation to have evidence in their case notes of non reversible airflow obstruction, usually on the basis of a previous trial of steroids, were excluded completely from the analysis described here.

Ninety per cent were on some form of asthma therapy before admission, with inhaled $B_2$ agonists the commonest form of treatment (85%) (Table 12 overleaf). Sixty one per cent were on long term asthma therapy as detailed in Figure 5. Of those taking regular inhaled steroids or cromoglycate, 28% admitted that they remembered to take the full daily dose on less than five days out of seven. Only 13% had an arrangement to start oral corticosteroids if their asthma deteriorated, with an

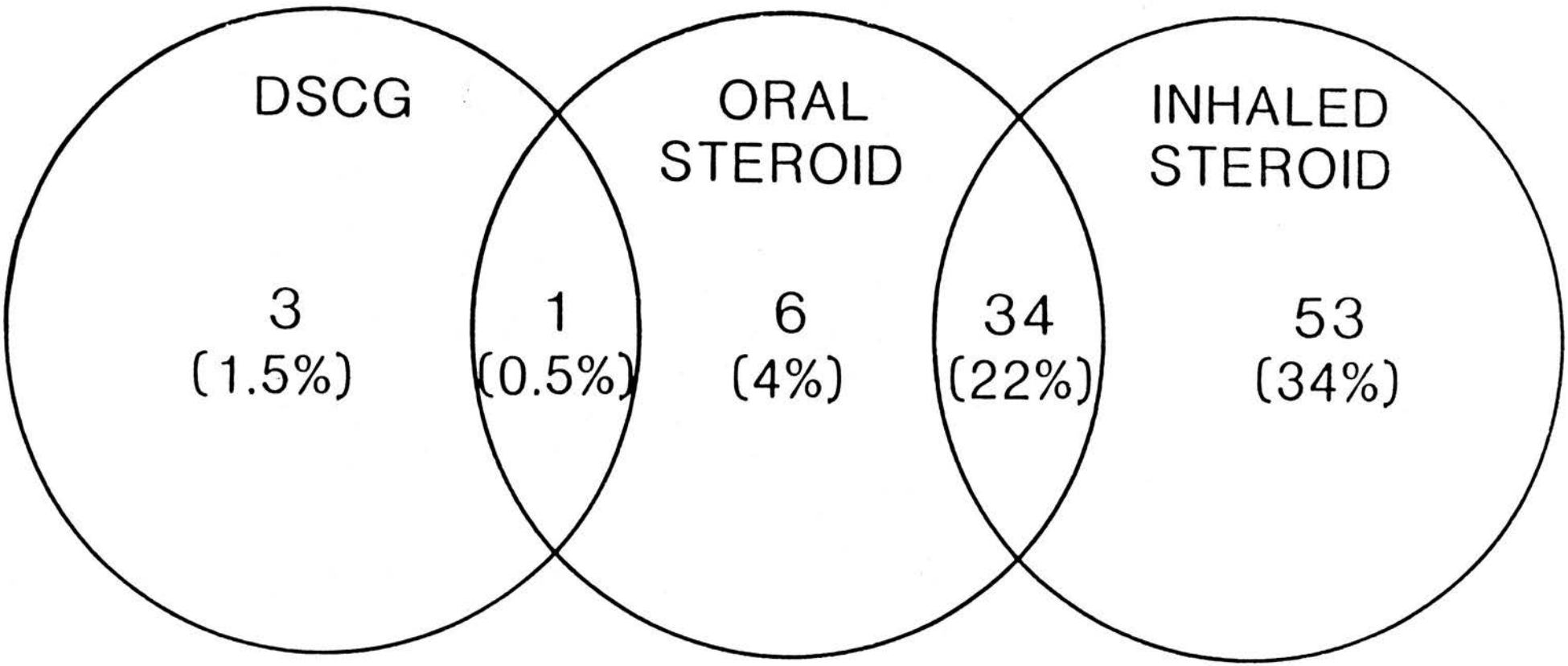
TABLE 12

REGULAR TREATMENT BEFORE INDEX ADMISSION

| DRUG | No. | (%) |
|---|---|---|
| Inhaled $B_2$ agonist | 133 | (85) |
| Theophylline | 65 | (41) |
| Low dose inhaled steroid* | 46 | (29) |
| High dose inhaled steroid | 43 | (27) |
| Regular oral steroid | 41 | (26) |
| Inhaled Ipratropium | 25 | (16) |
| Oral $B_2$ agonist | 12 | (8) |
| Sodium cromoglycate | 4 | (2) |

* <400 mg Beclomethasone or equivalent.

FIGURE 5: PROPORTIONS OF CASES ON LONG TERM SUPPRESSIVE ASTHMA TREATMENT




NONE = 61 (39%)

average starting dose of 31 mg (range 5 - 60 mg). Thirty two per cent gave a history of having had a sudden (developing within one hour) severe (not helped by inhalers and requiring medical attention) attack within the past three years. The median value for previous admissions to hospital with asthma was 1 (range 0-50, with 12 patients recalling an undefined large number of admissions). The median number of attendances to their general practitioners in the preceding year with exacerbations of asthma symptoms was 3 (range 0-12, four patients recalling an undefined large number). Thirty six per cent were attending a hospital asthma clinic and 26% attended their general practitioner regularly, these groups not being mutually exclusive.

(3) Events Leading to Hospital Admission

On average patients reported their asthma to have been deteriorating for a median 3 (range 0-42) days before admission; 38% described increasing symptoms for less than 24 hours. This compared well with information recorded in the hospital case notes, where patients were said to have had deteriorating asthma for a median (range) of 3 days (0-42) before admission, apart from 11% (18 cases) in whom poor asthma control was recorded for "weeks" before admission. On questioning patients closely it became clear, however, that many patients had been poorly controlled for a long time and were describing a "final straw" phenomenon (Arnold, 1982). This was formally assessed in the last 71 subjects, and showed that only 30% had truly episodic symptoms, while 10% had had regular symptoms of poor asthma control for weeks and 60% for months before hospital admission.

Forty five per cent of cases sought help from their general practitioners at the onset of the episode leading to hospital admission and for 91% of these some change in treatment was made. Sixty six per cent of those whose treatment was changed at that stage were given antibiotics, 44% a course of oral corticosteroids and 17% oral bronchodilators, some cases receiving more than one of these.

Immediately before admission 56% of all cases were seen by either their regular or emergency GP service and 26% of all cases were given some therapy before admission, parenteral theophylline being the commonest drug used.

(4) Hospital Assessment and Management

The average pulse rate on admission to hospital was 110 $\pm$ 19 bpm, 43% of cases having a pulse rate >110 bpm. Only 13% had peak flow rate recorded as part of initial assessment although 54% had subsequent recordings made. Seventy four per cent had arterial gases analysed, in 38% of these $pO_2$ was <60 mmHg.

All patients received nebulised bronchodilators regularly during their hospital admission. A course of oral corticosteroids was given to 73% of cases, with 20% receiving no steroid at all. When steroids were to be continued after discharge the average daily dose of prednisolone on discharge was 18 mg. Twenty one per cent of cases were given a bolus and 9% an infusion of aminophylline. Sixty one per cent were treated with antibiotics. Of 60% who received oxygen, only 27% of this subset were treated with high flow (at least 35%) oxygen.

TABLE 13

DIAGNOSIS RECORDED IN DISCHARGE SUMMARY

| | | |
|---|---|---|
| Acute asthma | 83 | (53%) |
| Asthma/bronchitis | 2 | (1%) |
| Exacerbation of chronic obstructive airways disease | 46 | (29%) |
| Other | 9 | (6%) |
| None | 12 | (8%) |
| Notes not available | 5 | (3%) |

Sixty one per cent of patients reported that their use of an inhaler had been checked in hospital but only 20% remembered being given some explanation of their drug therapy.
Thirty three per cent reported no change in previous therapy at the time of discharge, and this was confirmed from their case records. The dose of oral or inhaled therapy or both was reduced in a further 20%. Hospital review was planned for 68% of cases, an average of 3.5 $\pm$ 2 weeks later.

The diagnosis recorded on the discharge summaries of the 157 admissions is shown in Table 13. As can be seen, in only 53% of cases was this recorded for the general practitioner and future hospital reference as acute asthma, despite the fact that all cases were reported by medical and nursing staff as patients with asthma or wheezing illness in non smokers. Furthermore 86% had either previously recorded reversible airflow obstruction or were lifelong smokers with episodic wheeze (Table 11).

(5) Patients' Understanding of Asthma and Treatment

In view of the possibility that an earlier interview may have influenced patients' subsequent understanding of therapy, details relating only to first admissions (n=139) are included in this section.

81% of cases felt they would recognise a bad attack of asthma in the future, but this was usually on the rather non specific basis of increasing wheeze and chest tightness. Only 7% spontaneously mentioned sleep disturbance, 4% increased bronchodilator usage and 13% decreasing efficacy of inhaled bronchodilators as

TABLE 14

UNDERSTANDING OF ASTHMA THERAPY

| Category of Drug | Number (%) of Whole Sample Taking Drug | % of Those Taking Drug With | | |
|---|---|---|---|---|
| | | Some Idea of Action | No Idea of Action | Wrong Idea of Action |
| Inhaled $B_2$ agonist | 131 (94) | 41 | 56 | 3 |
| Inhaled steroid | 130 (72) | 32 | 61 | 7 |
| Oral steroid* | 65 (47) | 11 | 85 | 4 |
| Theophylline/oral $B_2$ agonist | 62 (45) | 18 | 82 | 0 |
| Ipratropium | 23 (18) | [35] | [65] | [0] |
| DSCG | 3 (2) | [33] | [66] | [0] |

* Includes some patients finishing a short course of oral steroids.

[ ] indicates small absolute numbers.

specific warning signs of a severe attack. Sixty three per cent said they would either call their doctor in an emergency or go straight to hospital, or vary this depending on severity of the attack, and 34% had no such appropriate plan of action in the event of a further attack. Although 13% on specific questioning had arrangements to start a course of oral steroids, only 2 patients (1%) volunteered that this would be their response to a further attack.

As shown in Table 14 many patients had no idea how their drugs worked, in particular whether they could expect some benefit within minutes (inhaled bronchodilators and Atrovent), hours (theophyllines, oral bronchodilator) or after prolonged use (inhaled and oral steroids, DSCG).

(6) Current Asthma Control

Thirty four per cent of cases reported regular sleep disturbance since hospital discharge, 50% regular morning chest tightness requiring them to use their bronchodilator before rising from bed and 49% wheeze climbing one flight of stairs.

Seventy seven per cent of cases had inhaler technique judged as either good or fair. Technique was judged to be good for the device being used if it was being used correctly. For the most commonly used metered dose inhaler this required that co-ordination was good, the patient made a long inspiratory effort and held his breath at the end (53%). Technique was described as fair (24%) if any of these elements was suboptimal, but a reasonable part of the dose had been inhaled.

DISCUSSION

No such prospective survey of hospital asthma management has previously been reported. Eighty one per cent of all asthma admissions to a single hospital over a calendar year have been included. Assessments, in the patients' homes, were all performed by a physician with previous experience of managing asthma. The group as a whole had clear histories and a majority had objective evidence of reversible airflow obstruction and were thus to be clearly differentiated from patients with an exacerbation of chronic bronchitis and minor associated wheeze. The group surveyed clearly had moderately severe asthma, with 61% receiving long term inhaled or oral corticosteroids. In this respect they were broadly similar to the BTA group of 90 asthma death cases (1982), of whom 69% were taking such treatment.

Several characteristics of the patients themselves deserve mention. Only 13% had been instructed to start a course of oral steroids if a further severe attack occurred but an even smaller proportion (2%) mentioned steroids specifically when asked what they would do in this event. Only a handful of cases had peak flow meters to use at home although 32% gave a history of sudden severe attacks. Compliance of the group was fair as far as this was judged with 72% of those on long term inhaled steroids or cromoglycate reporting taking their full dose at least five days per week. Less than half had been to see their general practitioner in the course of the index attack, a common reaction of patients being that such attacks were something which had to be tolerated and would settle with time. Indeed 34% had no appropriate plan of action in the event of a further attack. Most patients had little understanding of the way in which their drugs could be expected to help.



These observations are similar to surveys of asthma clinic attenders in Aberdeen (Ellis, 1985) and Inverness-shire (Franklin, 1987) and enlarge the BTA report findings (1982) that many patients and not only those dying of asthma underestimate their disease and delay calling help.

Asthma management is obviously individual both to patients and to some extent to physicians. Broad generalities do, however, exist and most respiratory physicians would probably agree that acute asthma should be treated with high flow oxygen, nebulised bronchodilators and oral corticosteroids, and that peak flow measurements provide an important objective measurement of airflow obstruction (Cushley, 1983). This survey describes current management practice in general medical wards.

Less than half of cases had been started on steroids before admission to hospital and 27% did not receive a course of oral steroids in hospital. This compares with 37% not given such treatment in both the pilot study (Chapter 2) and in a retrospective survey in 1978 (Osman, 1987). Where they were used, adequate instructions about further dosage appeared to have been given. Three symptoms were used of which (i) nocturnal and (ii) early morning asthma were assumed to indicate poor asthma control whereas (iii) exercise capacity gave a broader measure of patient's current state at the time of interview. The large proportion of patients with continuing symptoms of poor asthma control 13 days after discharge suggests that corrective and maintenance steroid therapy may have been inadequate.

Both general and hospital practitioners continue to be pre-occupied with bacterial infection as an underlying problem in asthma, with 66% of patients given antibiotics at home and 61% in hospital. This practice continues despite good evidence that such treatment has no impact on the duration and severity of asthma attack (Graham, 1982). Only a small proportion of cases were treated with high flow oxygen (27% of those receiving $O_2$) and very few had peak flow measured as part of initial assessment.

At least half of all cases had their previous regular treatment unaltered or even reduced in the aftermath of an asthma attack requiring hospital admission. This finding, together with the discrepancy between the reported median 3 day increase in asthma symptoms noted in the case records, compared with the 70% of cases who admitted to symptoms of poor asthma control either for weeks or months before admission, suggest that an inappropriately short term view of the illness was being taken. The average 3.5 weeks to follow-up, of those given such an opportunity also disregards the real possibility of symptoms recurring as the dose of oral steroids declines, soon after discharge.

In summary this prospective audit of hospital asthma management shows that asthma is often poorly treated in general medical units, with inadequate attention being paid to the importance of pre-existing poor asthma control, to the improvement of lung function and therapy, and to the close subsequent supervision of a group of patients in an unstable phase of their disease.

Subgroup analysis of some aspects of the management of these cases is discussed in the ensuing chapters, providing further more specific evidence of problem areas.

## CHAPTER 4 - DIFFERENCES IN HOSPITAL ASTHMA MANAGEMENT BETWEEN MEDICAL WARDS WITH A RESPIRATORY INTEREST AND OTHERS


### SUMMARY

Full details including admitting ward were available on 77% (150) of all asthma admissions in a prospective audit of hospital asthma management. Cases could be subdivided into 64 admitted to general wards with a respiratory input (Group R) and 86 to similar wards without such specialist interest (Group G). Cases in Groups R and G were similar in terms of age, previous severity of asthma, previous treatment and initial pulse rate. Fewer cases in Group G were treated with oral corticosteroids (R - 83%, G - 67% $p = 0.04$), had regular peak flow recordings (R - 73%, G - 42% $p < 0.005$) or were given return appointments (R - 92%, G - 56% $p < 0.005$) and fewer had their regular inhaled therapy increased after discharge (R -55%, G - 28%, $p < 0.005$). These differences in management were associated with more cases from Group G reporting sleep disturbance (R - 23%, G - 41% $p = 0.03$), morning chest tightness (R - 37%, G -55% $p = 0.03$) or wheeze on one flight of stairs (R - 34%, G -58% $p < 0.005$) at interview thirteen days later. In addition 20% of cases first admitted to medical wards with no specialist respiratory interest were re-admitted within the year compared with 2% of first admissions to medical wards with a respiratory interest ($p < 0.005$). The better outcome in Group R cases shows that their more intensive management, in line with standard respiratory practice, prevents much unnecessary morbidity.

## INTRODUCTION

The results described in the preceding chapter on the broad generalities of management and follow-up of acute asthma cases suggested underlying differences or inequalities in care. To investigate this further differences which existed between patients looked after in general medical units with a respiratory physician attached and in other units with no such specialist commitment were sought. That differences between such categories of wards may exist was suggested by the observed differences in asthma mortality rates between specialist thoracic and general medical units (Crompton, 1979; Hetzel, 1977). Furthermore, a retrospective survey of a random 25% of cases of acute asthma in one region in 1978 had shown differences particularly in the use of peak flow recording in hospital and the prescription of inhaled steroids after discharge (Osman, 1987).

In view of the arrangement of the medical units in the hospital surveyed, which has two general medical units with a respiratory input and two with no such commitment, subgroup analysis of these two groups of cases in terms of previous history and treatment, management of the acute attack and outcome was, therefore, undertaken. This analysis was also possible because patients had been seen at home without any knowledge of hospital management and in particular without knowledge of the admitting ward, so that the observations made at interview were effectively "blind" to this aspect.

### Statistical Analysis

Differences between groups were assessed by Chi squared analysis, to test the null hypothesis of no observed differences.

Case Control Analysis: Because there was a small difference in average age of Group R and G cases (see later), cases admitted to general medical wards with a respiratory input (R) were matched with controls from general medical wards with no specialist respiratory input (G) for three variables: (i) age, within ten years; (ii) duration of asthma; (iii) pre-existing maintenance treatment (none, inhaled or oral steroids or both). Differences in management and outcome variables of these matched pairs were analysed by the method of Breslow and Day (1981).

## RESULTS

Of 157 asthma admissions included in the survey full details were available for 150 (77% of all asthma admissions during that year). These 150 cases are further considered here, subdivided into cases admitted to two general medical units with a specialist respiratory input (Group R) and two general medical units without a specialist respiratory input (Group G). The specialist respiratory input consisted on one chest physician with three consultants with other interests, one middle grade (registrar or senior house officer) staff member with a commitment to respiratory medicine and residents who spent approximately one of their six months working in a chest unit. Thus although patients admitted as emergencies had a better chance of being assessed by those with a special interest this was not always the case in such wards.

There were sixty four (43%) cases in Group R and 86 (57%) in Group G. Forty seven per cent of patients in each group were males. Table 15 shows some characteristics of the two groups of

TABLE 15

PATIENT CHARACTERISTICS ON ADMISSION TO HOSPITAL

| | R | G |
|---|---|---|
| Number of cases admitted | 64 | 86 |
| Average age (years ± ISD) | 44.3 ± 18.7 | 50.6 ± 20.4 * |
| Diagnostic category (see text) | | |
| No. (%) with clear history ± PFTs (i + ii) | 49 (77%) | 63 (73%) |
| No. (%) with less certain history ± PFTs (iii) | 7 (11%) | 11 (13%) |
| No. (%) with less certain history, no PFTs (iv) | 8 (12%) | 12 (14%) |
| % Smokers (non, ex) | 31 (39,30) | 28 (44,28) * |
| Number (%) on steroids, any form before admission | 35 (60%) | 55 (64%) |
| Average number previous hospital admissions | 3.0 ± 7.7 | 3.9 ± 8.1 * |
| Average number exacerbations of wheeze in past year | 3.5 ± 5.4 | 3.9 ± 3.9 * |
| Av. time symptoms increasing before admission (days ± ISD) | 5.1 ± 5.4 | 3.9 ± 4.9 |
| Initial pulse rate (bpm ± ISD) | 109 ± 18.1 | 111 ± 20.6 |

* n = 57 n = 76
based on 1st admission only to avoid bias

patients in terms of average age, previous severity of asthma, previous treatment and initial pulse rate as a guide to severity of the index attack.

Each patient, at the time of his case record review was categorised on the certainty upon which a diagnosis of asthma was made. Four categories emerged as follows:-

(i) patients with a clear history of episodic wheeze, whether smokers or non smokers, with pulmonary function tests showing reversible airflow obstruction;

(ii) patients with a clear history of episodic wheeze, but no pulmonary function data available. All these patients were lifelong non smokers;

(iii) patients with a less certain history of wheeze, often smokers or ex smokers, but pulmonary function evidence of reversible airflow obstruction;

(iv) patients with a less certain history of wheeze, often smokers or ex smokers, and no pulmonary function results at all in their notes.

The proportions of Group R and G cases in each category was similar (Table 15) and in other respects the two groups of patients were comparable. The small difference in average age of patients was not significant at the 5% level and was not associated with any other difference in previous treatment or index of asthma severity (see later).

TABLE 16

HOSPITAL DIAGNOSIS, MANAGEMENT AND SUPERVISION

| | R | G | 95% Confidence Intervals |
|---|---|---|---|
| n | 64 | 86 | |
| Treatment in hospital: number (%) | | | |
| Oral corticosteroids | 53 (83) | 58 (67)* | 2.5%, 29.5% |
| Antibiotics | 35 (55) | 61 (71) | -31.5%, 0% |
| Aminophylline | 20 (31) | 25 (29) | - |
| Supervision: number (%) | | | |
| PEFR ± spirometry | 47 (73) | 36 (42)+ | 15.9%, 46.1% |
| Blood gas analysis | 50 (78) | 65 (76) | - |
| Inhaler technique assessed | 46 (72) | 45 (52)* | 6.2%, 33.8% |
| Explanation of drug action | 18 (28) | 12 (14)* | - |
| Diagnosis at discharge: number (%) | | | |
| Asthma | 41 (64) | 43 (50) | - |
| Chronic obstructive airways disease | 10 (16) | 35 (42)+ | -39.8%,-12.2% |
| Other | 12 (20) | 9 (10) | - |

* $p < 0.05$ + $p < 0.005$

Differences in hospital diagnosis, management and supervision are shown in Table 16. Differences in treatment and supervision on discharge from hospital and in outcome are shown in Tables 17 and 18.

Group R cases were significantly more likely to be treated with oral corticosteroids with a trend, not reaching significance of decreased use of antibiotics (Table 16). Group R cases were also significantly more likely to have peak flow rates or spirometry monitored ($p < 0.005$) although no difference between groups in terms of the frequency of arterial blood analyses was seen.

Significantly more Group R cases had inhaler technique checked although in fact there was no difference in the proportions of patients judged to have either good or fair inhaler technique at interview. More Group R cases remembered being given some explanation of the effect of drugs prescribed.

A highly significant difference ($p < 0.005$) was found between proportions of cases with no planned review appointments, (Table 17) although there was no difference in the planned average time to review between Groups R and G for cases being reviewed. Nevertheless a greater proportion of Group R had review appointments within a fortnight of discharge ($p < 0.025$). There were no differences between the groups in terms of changes in oral therapy after discharge but a greater proportion of Group R cases had inhaled therapy increased at the time of discharge ($p < 0.005$).

TABLE 17

MANAGEMENT AFTER DISCHARGE FROM HOSPITAL

| | R | G | 95% Confidence Intervals |
|---|---|---|---|
| n | 64 | 86 | |
| Change in Rx at discharge, number (%): | | | |
| Increase in oral Rx | 17 (27) | 16 (19) | - |
| No change in oral Rx | 43 (67) | 57 (66) | - |
| Increased inhaled Rx | 35 (55) | 24 (28)* | 8%, 46% |
| No change inhaled Rx | 22 (34) | 41 (49) | - |
| No review planned number (%) | 6 (9) | 39 (44)* | -47.6%,-22.4% |
| Average time to review, if this planned (wks) | 3.3 ± 1.7 | 4.15 ± 2.2 | - |
| % of those with review appointments having appointment within 2/52 | 36 (21/59) | 15 (7/47)+ | 6.4%, 35.6% |

* $p < 0.005$ + $p < 0.025$

TABLE 18

DIFFERENCES IN SHORT AND LONG TERM OUTCOME

| | R | G | 95% Confidence Intervals |
|---|---|---|---|
| n | 64 | 86 | |
| At follow-up interview: | | | |
| No. (%) reporting | | | |
| Sleep disturbance | 15 (23) | 35 (41)* | -32.6%, -3.4% |
| Morning tightness | 24 (37) | 47 (55)* | -33.8%, -2.2% |
| Wheeze on one flight of stairs | 22 (34) | 51 (58)+ | -39.6%, -8.4% |
| No. of first admissions | 57 | 76 | |
| No. (%) re-admitted within survey year | 1 (2)+ | 15 (20) | |

* $p < 0.05$ + $p < 0.005$

All these differences between Groups R and G were associated with significantly fewer symptoms reported by Group R of sleep disturbance, morning chest tightness and wheeze on climbing one flight of stairs at the time of interview (Table 18 overleaf).

In the course of the survey 17 patients had more than one admission to hospital with acute asthma. Sixteen patients had two admissions and one patient three admissions. Fifteen of the 17 patients (88%) were admitted on the first of their admissions to medical wards with no specialist respiratory input. Thus 20% of first admissions in Group G were re-admitted to hospital within the year compared with 2% for first admissions in Group R (Table 18) ($p < 0.005$).

Finally, there was a highly significant difference ($p < 0.005$) in the proportions of cases described as acute asthma or an exacerbation of chronic obstructive airways disease (COAD) between Groups R and G (Table 16). This was the case despite the fact that all cases were initially reported as acute asthma or wheezing illness in non smokers. In addition the proportions of cases in the various categories of diagnostic certainty for asthma were similar for Groups R and G (Table 15), suggesting that these diagnoses were being used indiscriminately in medical wards with no specialist respiratory interest.

In view of the small, albeit non-significant, difference in age between these two groups of cases, with older patients in Group G, Group R cases were matched with suitable control G group cases, as described in methods. This allowed a case control

TABLE 19

CASE CONTROL ANALYSIS OF 51 MATCHED PAIRS (68% of sample)

| | Variable | No. of discordant pairs | p |
|---|---|---|---|
| 1 | Oral corticosteroids given | 15, 5 | < 0.05 |
| 2 | Lung function monitored in hospital | 19, 4 | < 0.005 |
| 3 | Admissions coded as asthma, as opposed to COAD | 12, 2 | < 0.005 |
| 4 | Sleep disturbance at interview | 5, 17 | < 0.025 |
| | Morning chest tightness | 6, 16 | = 0.06 |
| | Wheeze on one flight of stairs | 7, 19 | < 0.05 |
| 5 | Clinic review planned | 24, 4 | < 0.0005 |

Note the first number gives the number of pairs the variable was present in R but not in G; the second is the number of pairs the variable was present in G but not R. Thus in 15 pairs oral corticosteroids were given to the patient in R but not to the corresponding matched patient in G. In only five pairs were they given to the patient in G but not to the one in R. In the other 31 pairs both patients received the same treatment.

analysis to be undertaken on 51 matched pairs (68% of the sample). The results of this analysis (Table 19) confirm the previous findings since all parameters remained significant with the exception that there was no significant discordance in the matched pairs as regards those whose inhaled treatment was increased at the time of discharge from hospital.

DISCUSSION

This analysis shows unequivocally that differences in hospital management are occurring regularly and that such variations are associated with difference in outcome, whether measured in the short term (symptoms of poorly controlled asthma two weeks after discharge from hospital) or long term (likelihood of re-admission to hospital within the year).

Descriptive studies such as this do not allow the findings to be related in a causal manner, although inferences may be made which in a purely scientific environment could then be formally tested. To use patients in this manner would not however be ethical.

Previous evidence, as discussed in Chapter 1, has suggested that under-treatment and under-supervision of asthmatics is potentially dangerous. The analysis presented in this chapter shows as definitely as would be regarded by most to be ethically reasonable, that underuse of oral and inhaled corticosteroids and poor supervision in hospital and soon after discharge are associated with excess, and by inference, preventable morbidity.

The study was not designed to assess any excess mortality, for which much greater numbers would have been necessary. Compared with the small number of patients dying of asthma, however, the problem of preventable morbidity in patients surviving an acute asthma attack resulting in hospitalisation is much larger.

A retrospective random sample of asthma cases treated by specialist thoracic and general physicians reported recently but carried out in 1978 (Osman, 1987) also showed differences in management similar to those described here. That similar findings were made in 1986 shows that medical practice has not substantially changed.

In summary, two historically similar groups of asthmatics, with similar severity of the acute index attack have been managed differently and a regime employing oral corticosteroids, regular objective measurement of lung function to assess response, greater use of inhaled therapy particularly inhaled corticosteroids and close supervision after hospital discharge has been shown to be superior in terms of both short and long term outcome.

# CHAPTER 5 - HOSPITAL MANAGEMENT OF ASTHMATICS COMPARED WITH THOSE GIVEN A DIAGNOSTIC LABEL OF "CHRONIC OBSTRUCTIVE AIRWAYS DISEASE"


## SUMMARY

The management of 46 asthma cases in whom the hospital discharge diagnosis was Chronic Obstructive Airways Disease (COAD) was compared with 85 cases with a final diagnosis of uncomplicated asthma. The group labelled COAD were older ($p < 0.005$), more likely to be male ($p = 0.02$), smokers or ex smokers ($p < 0.005$) and less likely to have objective evidence of reversible airflow obstruction recorded in their case notes ($p = 0.03$). Nevertheless, more were taking inhaled and oral corticosteroids before admission to hospital. No differences in the use of oral corticosteroids, or antibiotics in hospital or in the use of inhaled corticosteroids after discharge were observed between those labelled COAD and asthma.

Fewer COAD cases had peak flow recordings made in hospital ($p < 0.005$) or hospital review arranged ($p = 0.03$). At interview a fortnight after discharge from hospital similar proportions of "COAD" and asthma labelled cases reported symptoms of poorly controlled asthma although more COAD cases described wheeze on climbing one flight of stairs ($p < 0.05$).

This data suggests that asthma may be being underdiagnosed in older males with a smoking history by failing to evaluate their symptoms objectively or over time. Nevertheless, this group was not treated differently than those with a diagnosis of uncomplicated asthma.

INTRODUCTION

A subgroup of 46 cases (29%) out of the total of 157 admissions for acute asthma or wheezing illness in non smokers had a final diagnosis of COAD made. This chapter examines some differences in background history, management and outcome between this group and the larger group (85, 54%) with a final diagnosis of uncomplicated asthma.

RESULTS

Table 20 shows the average age, sex ratio and initial pulse rate of these two groups. Table 21 outlines various aspects of previous treatment and severity of asthma and the proportions giving a clear history of sudden severe attacks of wheeze, as previously defined.

Table 22 shows the smoking history and details, from information available in the hospital record, how firmly a diagnosis of asthma could be made. Tables 23 and 24 outline some aspects of hospital management and Table 25 follow-up and outcome. Each of these areas will now be discussed, the layout being designed so that the table under discussion can be seen at the same time.

TABLE 20

PATIENT DETAILS

| | Asthma Group | COAD Group | |
|---|---|---|---|
| No. of cases | 85 | 46 | |
| No. of patients | 74 | 41 | |
| Average age (years ± ISD)* | 39.3 ± 17.1 | 66.5 ± 10.5 | p<0.005 |
| Number (%) males* | 29 (39) | 26 (63) | p=0.02 |
| Initial pulse rate (bpm ± ISD) | 110 ± 25 | 106 ± 20 | ns |
| No. (%) admitted to non respiratory medical units | 43 (51) | 36 (78) | p<0.01 |

* Data from first admissions only used to prevent bias.

DISCUSSION

Cases labelled COAD were significantly older than others, and more likely to be male. There was no difference in average pulse rate on admission, showing at least an initial similarity in the acute illness in these two groups. Pulse rate has been shown to correlate closely with other clinical indices of airflow obstruction such as breathlessness, ability to move or speak and peak flow rate (Arnold, 1982). Significantly more cases admitted to medical wards with no specialist respiratory input received a discharge diagnosis of COAD compared with cases admitted to medical units with such an interest. This was the case despite the observation (Chapter 4) that the proportion of cases with previously documented reversible airflow obstruction were similar in these groups (Table 15).

TABLE 21

DETAILS OF PREVIOUS ASTHMA HISTORY AND TREATMENT

| | Asthma Group | COAD Group | |
|---|---|---|---|
| No. of cases | 85 | 46 | |
| Average no. previous admissions (± ISD)* | 2.7 ± 5 | 2.6 ± 5 | ns |
| Average no. exacerbations of wheeze within year (± ISD)* | 3.3 ± 3.4 | 3.9 ± 4 | ns |
| Long term treatment before admission No. (%) on | | | |
| inhaled $B_2$ agonists | 69 (81) | 41 (89) | ns |
| inhaled CS, any dose | 44 (52) | 29 (63) | ns |
| regular oral CS | 22 (26) | 15 (33) | ns |
| No. (%) with history of sudden severe attack* | 19 (26) | 14 (34) | ns |
| No. (%) attending asthma clinic regularly | 31 (36) | 17 (37) | ns |

* n = 115, first admissions data only used to prevent bias.

CS = corticosteroids.

Similar proportions of COAD and asthma labelled cases were taking $B_2$ agonists and inhaled or oral corticosteroids before admission, suggesting that a possible diagnosis of asthma had been entertained equally in both groups in the past. There was no difference in severity of disease, as judged by previous hospital admissions or exacerbations of wheeze in the preceding year and similar proportions described sudden attacks of severe wheeze within the past three years. All these similarities suggest we are dealing with not two but one homogenous group.

TABLE 22

SMOKING HISTORY AND HISTORICAL EVIDENCE OF ASTHMA

| | Asthma Group | COAD Group | |
|---|---|---|---|
| No. of patients * | 74 | 41 | |
| Smoking History | | | |
| No. (%) | | | |
| lifelong non smoker | 42 (57) | 9 (22) | p<0.005 |
| ex smoker | 14 (19) | 17 (41) | |
| current smoker | 18 (24) | 15 (37) | |
| Evidence of Asthma | | | |
| No. (%) | | | |
| with history of wheeze and proven reversible airflow obstruction | 48 (65) | 7 (17) | |
| with clear history of wheeze only | 22 (30) | 9 (22) | |
| with less certain history of wheeze and no pulmonary function results | 1 (1) | 13 (32) | p=0.03 |
| with previous documented response to bronchodilator or steroids (but not in any category above) | 3 (4) | 12 (29) | |

* refers to first admissions only

More of the COAD labelled group were smokers or ex smokers and significantly fewer of this group had previously documented reversible airflow obstruction. Thus of 14 cases in the whole survey group with an uncertain history of intermittent wheeze, and no pulmonary function results available (those with documented irreversible airflow obstruction having been totally excluded) 13 were labelled COAD. In these 13 cases such an imprecise diagnostic label may have been correct. Nevertheless, just under half of the COAD labelled group (19/46, 46%) had previously documented reversible airflow obstruction.

TABLE 23

HOSPITAL MANAGEMENT

| | Asthma Group | COAD Group | |
|---|---|---|---|
| No. of cases | 85 | 46 | |
| No. (%) | | | |
| given oral CS | 67 (79) | 31 (67) | ns |
| given aminophylline IV | 32 (38) | 7 (15) | p<0.05 |
| given antibiotics | 52 (61) | 34 (74) | ns |
| No. (%) | | | |
| given no $O_2$ | 31 (37) | 12 (26) | ) |
| given 24% $O_2$ | 18 (21) | 26 (57) | ) p<0.005 |
| given > 24% $O_2$ | 33 (39) | 7 (15) | ) |
| ($O_2$ use not recorded) | 3 | 1 | ) |
| No. (%) having peak flow rates or spirometry monitored | 56 (66) | 16 (35) | p <0.005 |

TABLE 24

THERAPY ON DISCHARGE FROM HOSPITAL

| | Asthma Group | COAD Group | |
|---|---|---|---|
| No. of cases | 85 | 46 | |
| No. (%) whose oral Rx was increased at discharge | 19 (22) | 9 (20) | ns |
| No. (%) whose inhaled Rx (any form) was increased at discharge | 39 (46) | 11 (24) | p<0.05 |
| No. (%) on inhaled CS at discharge | | | |
| - low dose | 20 (23) | 9 (20) | ns |
| - high dose | 40 (47) | 13 (28) | ns |
| No. (%) on long term oral CS at discharge | 28 (33) | 18 (39) | ns |

Oral corticosteroids were used with equal frequency in asthma and COAD labelled cases, as were antibiotics. Intravenous aminophylline was used more frequently in those subsequently labelled asthma, as was high flow $O_2$. Regular peak flow recordings, or spirometry was monitored less often in COAD cases.

Significantly fewer COAD labelled cases had their inhaled therapy increased on discharge from hospital. This was associated with a non-significant trend in favour of more asthma cases then being treated with high dose inhaled corticosteroids (47% of asthma, 28% of COAD labelled cases).

TABLE 25

REVIEW ARRANGEMENTS AND OUTCOME

| | Asthma Group | COAD Group | |
|---|---|---|---|
| No. of cases | 85 | 46 | |
| No. (%) with planned review appointments | 64 (75) | 25 (54) | $p<0.05$ |
| Average time to review (weeks ± ISD) | 3.5 ± 1.9 | 4.4 ± 2.1 | ns |
| Symptoms at interview No. (%) | | | |
| with sleep disturbance | 28 (34) | 19 (41) | ns |
| with morning tightness | 41 (49) | 22 (48) | ns |
| with wheeze climbing one flight of stairs | 36 (43) | 31 (67) | $p<0.05$ |

At interview a fortnight later, similar proportions of COAD and asthma labelled cases reported regular sleep disturbance due to wheeze or morning chest tightness - classic symptoms of poorly controlled asthma. Considerably more COAD cases described wheeze on one flight of stairs ($p<0.05$).

## GENERAL DISCUSSION

All cases included in this survey were initially reported as asthma admissions or as wheezing illnesses in non smokers. A proportion were subsequently labelled COAD. The similarities between cases finally labelled as COAD and asthma described here suggest they belong to a single category; asthma therapy was being used equally often, sudden severe wheeze was reported by similar proportions and after discharge symptoms of poorly controlled asthma were reported equally often. The differences are of great interest - COAD labelled cases were older, male, smokers or ex smokers and less likely to have documented reversible airflow obstruction, or to have peak flow rates monitored. They were less likely to be reviewed after discharge and reported greater exercise limitation, despite broadly similar treatment regimes to those labelled asthma.

These observations are corroborated by a longitudinal survey of respiratory morbidity started in Tucson, Arizona in 1976. This has shown (Dodge, 1980 and 1986) that those over forty years of age labelled as asthma, emphysema and chronic bronchitis report similar symptoms and smoking histories. Detailed analysis of their subjects suggests that gender is a major determinant of diagnostic category with older males reporting wheeze, dyspnoea and attacks of shortness of breath with wheeze likely to be diagnosed as having emphysema and females with similar symptoms as asthma.

The observation that oral corticosteroids were used with equal frequency in COAD and asthma cases in this population and that inhaled steroids were started or increased equally often suggest that the differences in diagnostic label may be clinically unimportant. This is at variance with Speight's finding (1983) that in childhood asthma naming the condition as such was a major determinant of giving specific anti asthma therapy. However, the lesser use of peak flow readings to measure response to therapy objectively, the tendency to discharge patients without review and to label patients with proven asthma (as judged by documented reversible airflow obstruction) with the less precise portmanteau term "COAD" suggest that therapy may not have been tailored to patients' needs. It may partially explain the excess of such cases reporting marked exercise limitation due to wheeze. Whilst this minor difference in outcome may be due to inherent differences between the groups not otherwise identified, it may also be due to differences in management which would fail to detect reversible airways obstruction.

## CHAPTER 6 - PATIENTS WITH MORE THAN A SINGLE ADMISSION DUE TO ACUTE ASTHMA


### SUMMARY

Historical details and management of 17 patients who had more than a single admission with acute asthma during the course of the survey were compared with the 61 patients who had a single admission to medical wards with no specialist interest and 56 to medical wards with a respiratory interest.

No differences in previous asthma treatment or severity of asthma, or of the index admission were seen, and similar proportions had a secure diagnosis of asthma.

Fewer of those subsequently re-admitted had inhaled corticosteroids increased (or started) on discharge from hospital ($p < 0.005$) and the median dose of prednisolone on discharge was lowest in this group (10 mg, $p < 0.05$). In addition the time interval to review was longest in those subsequently re-admitted (median 5 weeks, $p = 0.055$). Oral corticosteroids were given to most in hospital and peak flow rates monitored in the majority (65%).

More of this group reported sleep disturbance and morning chest tightness at interview, confirming the prognostic importance of such continuing symptoms.

The failure to maintain oral corticosteroids or give inhaled steroids or review such patients are shown to be the major differences in management which are likely to have contributed towards subsequent re-admission.

## INTRODUCTION

In the course of the survey, 17 patients had more than a single admission with acute asthma to the hospital; 16 patients had two admissions and a single patient three admissions. Frequent hospital admissions for asthma may occur because of severe disease, or sudden onset of severe wheeze, because of poor compliance or undertreatment or may be related to other factors such as patients' understanding of their disease and ability to cope. To examine these interactions, some aspects of the history and management of this group have been compared with those having a single hospital admission.

## METHOD AND PATIENTS

Of 139 patients involved in the entire survey full details including admitting ward and details of hospital management were available for 134. Of the five remaining patients, the case notes were unobtainable for three, and for two others the admitting ward was unknown. These 134 could be divided into three groups:-

Group A - 61 patients with a single admission to medical wards with no respiratory interest.

Group B - 56 patients with a single admission to medical wards with a specialist respiratory interest.

TABLE 26

PATIENT CHARACTERISTICS

| | A Single admission to non specialist wards | B Single admission to specialist wards | C First of more than one admission |
|---|---|---|---|
| n | 61 | 56 | 17 |
| Average age (years) (SD) | 51 (20) | 44 (18) | 51 (22) |
| | 61 | 56 | 17 |
| Average initial pulse rate (SD) | 111 (20) | 107 (23) | 115 (20) |
| Median number of previous hospital admissions | 2 | 1 | 1 |
| Median number GP visits in previous year | 3 | 2 | 3 |
| Median length hospital stay (days) | 5 | 6 | 7 |
| Median duration poor asthma control (days) (range) | 4 (0-30) | 3 (1-42) | 5 (2-21) |
| No. (%) with proven reversible airflow obstruction, or who were lifelong non smokers with wheeze | 51 (84) | 49 (87) | 16 (94) |

Group C - 17 patients admitted more than once. Only the first of these patients' admissions will be considered here.

History and management variables for these three groups were compared by Chi squared testing for grouped data or Kruskal-Wallis test, for medians and ranges. Averages were compared by Student's t-testing. It was felt to be unsatisfactory to simply compare the 17 re-admitted patients with all those having a single admission, since this latter group has been shown (Chapter 4) to contain groups of patients whose management had been substantially different.

RESULTS

These are presented in tabular form in the ensuing pages, with the relevant discussion adjacent.

The average ages of these three groups of patients were similar (Table 26) and there were no differences in pulse rate on admission, which is the best guide available to severity of the index attack.

Likewise there were no differences in the median number of previous hospital admissions or GP visits within the previous year with exacerbations of wheeze. The time spent in hospital was similar and all groups were recorded as having had deteriorating asthma for similar lengths of time. The proportions with a secure diagnosis of asthma (categories (i), (ii) and (iii), Chapter 3, Table 11) were similar.

TABLE 27

TREATMENT BEFORE ADMISSION, AND ON DISCHARGE FROM HOSPITAL

| | A Single admission to non specialist wards | B Single admission to specialist wards | C First of more than one admission |
|---|---|---|---|
| Before admission: | | | |
| No. (%) on inhaled CS | 32 (52) | 27 (48) | 10 (58) |
| No. on regular oral CS | 4 | 1 | 0 |
| After discharge: | | | |
| No. (%) whose Rx unchanged | 23 (38) | 16 (29) | 5 (29) |
| No. (%) on inhaled CS | 40 (66) | 47 (84) | 9 (53)* |
| No. whose dose of inhaled CS increased compared with admission (included those started on inhaled CS) (% of those discharged on inhaled CS) | 17 (42) | 33 (70) | 2 (22)+ |
| No. (%) on oral CS at interview | 24 (39) | 28 (50) | 9 (53) |
| Median dose prednisolone (mg) | 16.5 | 20 | 10 # |

* $p < 0.025$

+ $p < 0.005$

# $p < 0.05$ KW test

There was therefore no evidence of any difference up to the time of hospital admission between these three groups.

Similar proportions of each group were taking inhaled corticosteroids before admission and only small numbers were on regular oral steroids (Table 27).

Whilst by the time of discharge from hospital many more patients in each group were taking oral steroids, at least in the short term, the median dose of prednisolone on discharge was lowest in the group of those subsequently re-admitted.

In addition fewer of this group (C) had inhaled corticosteroids started, or the dose increased at the time of hospital discharge.

TABLE 28

TREATMENT AND SUPERVISION IN HOSPITAL

| | A Single admission to non specialist wards | B Single admission to specialist wards | C First of more than one admission |
|---|---|---|---|
| Peak flow or PFTS monitored | 23 (38)* | 40 (71) | 11 (65) |
| Oral CS given | 35 (57) | 45 (80) | 16 (94)* |
| Antibiotics | 47 (77)* | 30 (54) | 9 (53) |
| Aminophylline | 16 (26) | 17 (30) | 8 (47) |
| Oxygen | 40 (66) | 29 (52) | 12 (71) |

* $p < 0.005$

The significant differences in various aspects of hospital management (Table 28) are not surprising since they re-iterate the findings in Chapter 4. The important fact to emerge from this analysis is that in bald terms of treatment given, Group C fared reasonably well. Thus most were given oral corticosteroids in hospital (although no data on doses is available) and a majority had peak flow rates monitored. In general terms they were more intensively managed than Group A.

TABLE 29

REVIEW ARRANGEMENTS AND SYMPTOMS AT INTERVIEW

| | A Single admission to non specialist wards | B Single admission to specialist wards | C First of more than one admission |
|---|---|---|---|
| Clinic review planned | 29 (48)+ | 51 (91) | 10 (59) |
| Median time to review (weeks) | 4 | 4 | 5* |
| Coherent plan if further attack | 40 (66) | 33 (59) | 12 (71) |
| Symptoms at interview | | | |
| Sleep disturbance | 23 (38) | 13 (23) | 8 (47) |
| Morning chest tightness | 31 (51) | 21 (37) | 12 (71)# |
| Wheeze on one flight of stairs | 37 (61)# | 20 (36) | 8 (47) |

+ $p << 0.005$

* $p = 0.055$ KW

# $p < 0.05$

Again more of Group C had review arrangements than Group A, but still far fewer than Group B, and the median time to review was longest in this group (Table 29).

Similar proportions of each group had a coherent plan in the event of a further severe attack of wheeze (i.e. they would call their own GP, go straight to hospital or vary this depending on the severity of wheeze).

By the time of follow-up interview, more of Group C patients reported sleep disturbance (although this did not reach statistical significance with $p = 0.01$) and morning chest tightness, compared with Groups A and B. The association of such symptom reporting with the greater likelihood of subsequent hospital admission confirms the importance of such symptoms as those typical of poorly controlled asthma.

GENERAL DISCUSSION

The important differences which this analysis show relate to treatment and management arrangements at the time of hospital discharge. Others have commented on the risk of death from asthma in the period soon after discharge from hospital (Macdonald, 1976(b); Ormerod, 1980). The association of continuing symptoms of poorly controlled asthma is shown here to be associated with the lesser use of oral and inhaled corticosteroids and greater likelihood of further admission.

A protective role for inhaled corticosteroids was also shown in Chapter 4, since a significantly greater proportion of patients from medical wards with a specialist respiratory interest were discharged on this form of therapy and fewer of these were re-admitted.

This analysis also confirms the importance of early review of the asthmatic patient, so that the recurrence of symptoms, whether due to withdrawal of oral corticosteroids, or nebulised bronchodilators or to return to the home environment, may be appreciated at an earlier stage.

## CHAPTER 7 - A SURVEY OF ASTHMA MANAGEMENT IN THE COMMUNITY


### SUMMARY

General practitioners of five health centres serving a population of 120,000 (17% of Glasgow's population) completed a simple encounter form for 782 attendances due to asthma during a two month period. This sample was estimated to represent 56% of all such consultations over this period. Eighty one consultations were recorded by a single practitioner with a special interest in asthma, 701 by others. The practitioner with a special interest in asthma saw cases more frequently ($p<0.005$) and judged more to be adequately controlled ($p<0.05$) than others. More of his cases were receiving inhaled corticosteroids ($p<0.005$) and fewer long term oral corticosteroids ($p<0.05$).

If a change in therapy was made, this practitioner increased inhaled therapy most often (68%), with a course of oral corticosteroids his second option (18%). Other practitioners were most likely to use antibiotics (56%) and least likely to use oral corticosteroids (15%) in these circumstances. This sample of general practice asthma consultations shows the same discrepancies in asthma management as were observed in the hospital survey where differences in management between physicians with an interest in asthma and others were in addition shown to be associated with marked differences in short and long term morbidity.

## INTRODUCTION

Several studies of childhood respiratory complaints, either performed as part of the school medical service (Anderson, 1981; Lee, 1983; Speight, 1983) or confined to a single practice (Levy, 1984) have shown that asthma is underdiagnosed and specific therapy often not used.

Similar surveys of adult asthma management are more difficult to organise, depending on maximum co-operation of practitioners, the use of disease registers and research personnel (Modell, 1983). Anecdotal accounts, extrapolating from retrospective surveys of deaths from asthma (Seaton, 1978) suggest that adult asthma management is often suboptimal, but the evidence for this is lacking.

A survey of the management of asthma in a total population of 120,000 was, therefore, performed as the first stage of an evaluation of an education programme which is described in Chapter 8.

## METHOD

The practitioners of five large health centres, two suburban and three serving inner city areas took part in the survey. The study population of 120,000 represents 17% of the Glasgow population (720,000).

Information on asthma attendances at these practices was recorded in September and October 1985. No diagnostic criteria were imposed upon participating practitioners for the purposes of the study.

Practitioners were asked to complete a simple encounter form every time they saw a patient whom they considered to have asthma. The information required was set out as a series of defined options, so that forms could be completed by ticking the appropriate boxes (see Appendix 2). As well as the age and sex of the patient, the following information was sought:-

(i) The interval since the patient last attended because of asthma - this allowed for the possibility of a new diagnosis of asthma being made.

(ii) The reason for attendance: Four options were given, namely (1) routine visit, adequate control, (2) routine visit, inadequate control, (3) exacerbation, non urgent consultation and (4) exacerbation, urgent consultation. Detailed notes on these four categories were contained on the inside front cover of the pad of forms, so that they were visible each time a form was completed.

(iii) Current steroid therapy: Three categories, not mutually exclusive were given. These were inhaled, intermittent oral and regular oral.

(iv) Further management: Four options were given; (1) continue as before, (2) change regime, (3) refer to outpatients, (4) refer for admission. If option (2) was chosen there were six categories to describe the changes made. These were to decrease or increase inhaled therapy (this option including start inhaled therapy), give oral corticosteroids, antibiotics, oral

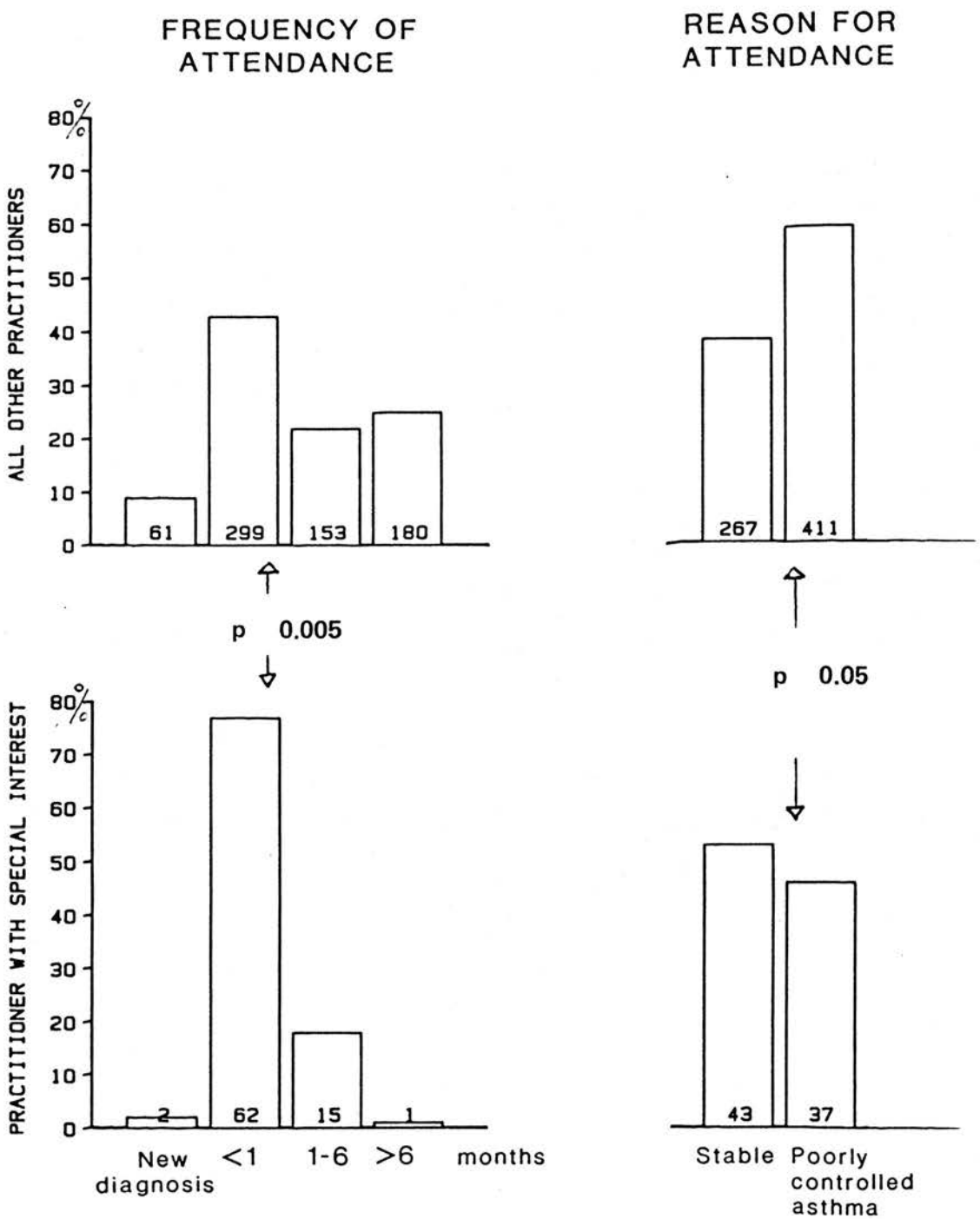



FIGURE 6

RAW DATA IN TABLE 30, APPENDED

bronchodilator or injection (not further specified).

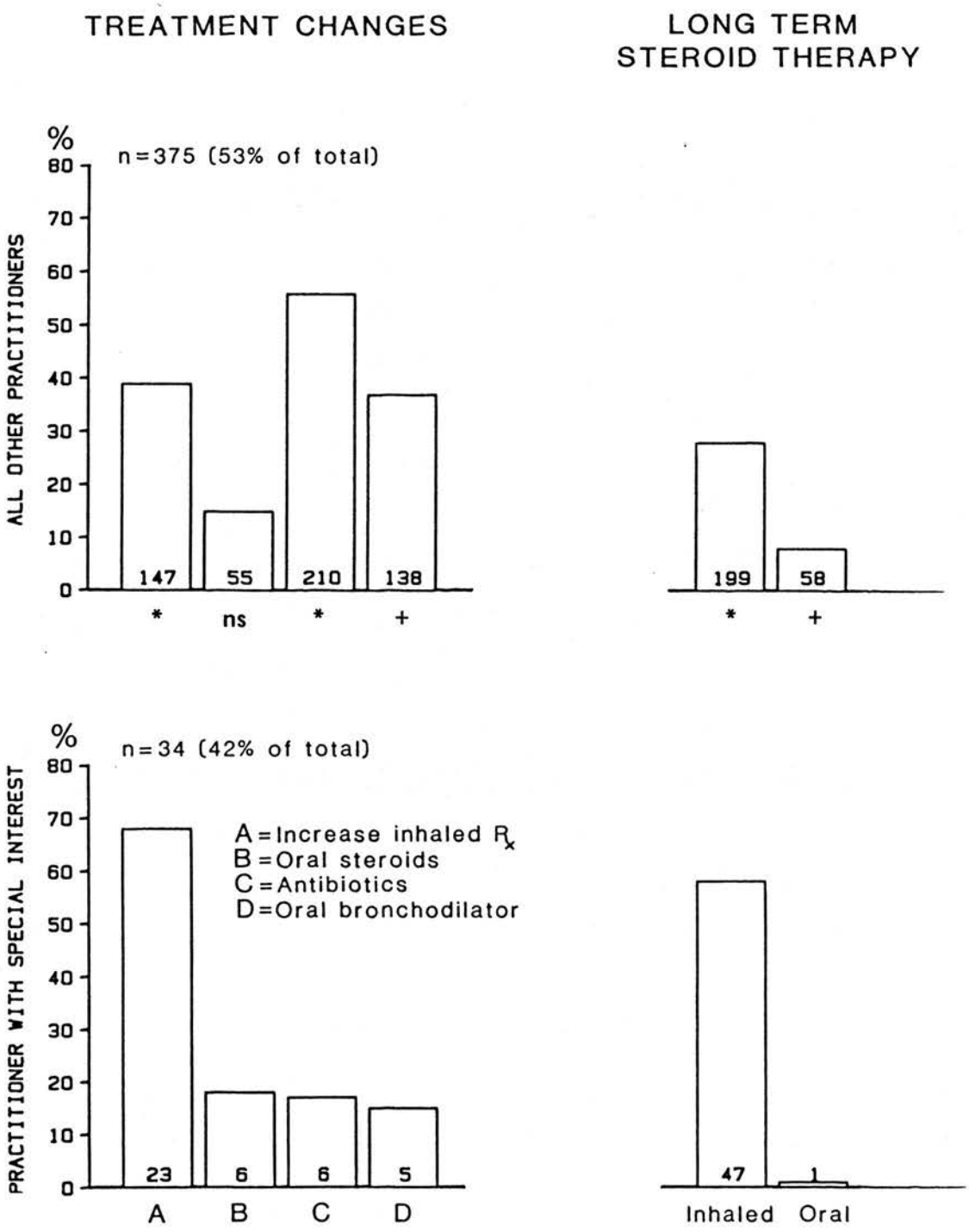
Each participating practitioner and associated trainees were given a pad of encounter forms and the opportunity to clarify any queries. Completed forms were collected weekly.

The survey population included a single practitioner (X) with an avowed special interest in asthma, who ran a weekly asthma clinic, used peak flow recordings regularly both in the surgery and at home, and functioned in a similar manner to a specialist asthma clinic. This practitioner's practice was, therefore, also surveyed and his results akin to an internal standard of community asthma care compared with others. Differences between groups were compared by Chi squared analysis.

RESULTS

Seven hundred and one attendances for asthma were recorded by all other practitioners and 81 by X over the two month period.

The average age and proportions of different age groups (Table 30) was similar for these two groups of cases. Cases seen by X were reviewed more frequently ($p<0.005$) and were less likely to be judged poorly controlled when seen ($p<0.05$) (Figure 6). The smaller proportion of emergency consultations by X may not be a significant finding since such calls occurring in the health centre from which he practises would be dealt with on a rotating basis by himself and colleagues.




* $p < 0.005$

\+ $p < 0.05$

FIGURE 7

RAW DATA IN TABLES 31 AND 33, APPENDED

More of X's cases were receiving regular inhaled corticosteroids ($p<0.005$) and fewer long term oral steroids ($p<0.05$) (Table 31) (Figure 7). Table 32 shows the outcome of all consultations, the somewhat greater proportion of cases having therapy altered by the group of all other practitioners being related in all probability to the greater proportion of this group judged poorly controlled.

Specific management changes (Table 33 and Figure 7) show that cases seen by all other practitioners were most likely to be treated with antibiotics, if any change was made. Similar proportions of cases were treated with an increase in inhaled therapy (not further specified) or oral bronchodilator. Practitioner X, however, used antibiotics and oral bronchodilators significantly less often, relying on increased inhaled therapy to a far greater extent. Oral corticosteroids were used equally by both groups.

## DISCUSSION

This survey documents current asthma management in a large number of general practice consultations. By using a large survey population to obtain such a sample of transactions in asthma care it was believed that individual variations in practice would be lost and the broad outline of current practice seen.

The fact that no diagnostic criteria were imposed for the purposes of the study may have contributed to the large number of transactions recorded. No attempt was made to define the management of other patients attending with asthma - like symptoms but with other diagnoses. Such a subgroup, particularly in middle aged adult males has been shown in a total

community survey in Tucson, Arizona (Dodge, 1980 and 1986). However, since at least in childhood asthma, naming the condition as such has been shown to be a major determinant of using specific therapy (Speight, 1983) it seems likely that such patients (with asthma-like symptoms but not so diagnosed) will not have had specific asthma therapy exhibited to any greater extent than the sample described here.

The survey shows marked differences in management between a group of around 100 practitioners and a single one with a special interest in asthma.

An over-emphasis on the use of antibiotics is confirmed (Marks, 1983), a form of therapy which has no influence on the duration or outcome of an exacerbation of asthma (Graham, 1982). Since such therapy was the only treatment given to 64 of those treated by all other practitioners (17% of those whose therapy was changed, and 30% of all those treated with antibiotics) a deal of unnecessary morbidity must inevitably have followed. No patient treated by X with antibiotics received only this form of therapy.

Oral corticosteroids were used with equal frequency in both groups of cases. However, where in X's practice corticosteroids were second line therapy, after an increase in inhaled treatment, other practitioners used corticosteroids as their fourth and least likely treatment option (after antibiotics, oral bronchodilators or inhaled therapy).

Twice as many cases seen by X were receiving inhaled corticosteroids. Since X regularly monitored peak flow rates and had many patients using diary cards to record symptoms at home it is probable that in most of these cases the need for and response to inhaled corticosteroids will have been documented. In a descriptive study, however, it is impossible to draw a causal relationship between steroid usage and the observation that more of X's cases were considered well controlled. This latter observation probably has at least as much to do with X's pattern of clinical practice.

The two groups of cases compared in this chapter were not controlled or known to be similar in terms of severity of asthma, but if any difference existed it seems more likely that the practitioner with a special interest in asthma will have accumulated more of the severe or chronic asthmatics than the opposite bias. Bearing this in mind, this survey of community asthma management shows many of the features described in the previous hospital studies (Chapters 3 and 4). In both settings those with a special interest in asthma are seen to use inhaled corticosteroids more often, and to manage poorly controlled asthma significantly differently from colleagues with no such special interest.

TABLE 30

CONSULTATION CHARACTERISTICS

| | Cases seen by all other practitioners | Cases seen by X | p |
|---|---|---|---|
| n | 701 | 81 | |
| Average age (years ± ISD) | 40.1 ± 25.4 | 45.8 ± 23.2 | ns |
| No. (%) | | | |
| aged < 4 years | 46 (7) | 6 (7) | |
| aged 5-15 years | 99 (14) | 9 (11) | ns |
| aged > 15 years | 534 (76) | 66 (82) | |
| where age not stated | 22 (3) | 0 | |
| Time interval since last attendance | | | |
| No. (%) | | | |
| with new diagnosis of asthma | 61 (9) | 2 (2) | ) |
| seen within 1 month | 299 (43) | 62 (77) | ) |
| seen 1-6 months previously | 153 (22) | 15 (18) | )<<0.005 |
| > 6 months previously | 180 (25) | 1 (1) | ) |
| not stated | 8 (1) | 1 (1) | ) |
| Reason for attendance (see text) | | | |
| Routine, good control (1), no. (%) | 267 (38) | 43 (53) | ) |
| Poorly controlled (2, 3 or 4), no. (%) | 411 (59) | 37 (46) | ) <0.05 |
| Emergency (4 only), no. (%) | 101 (14) | 3 (4) | ) |
| Not stated | 23 (3) | 0 | |

TABLE 31

LONG TERM STEROID THERAPY

| | Cases seen by all other practitioners | Cases seen by X | p |
|---|---|---|---|
| n | 701 | 81 | |
| No. (%) not on inhaled corticosteroids (CS) | 400 (57) | 32 (39) | <0.005 |
| No. (%) on inhaled CS | 199 (28) | 47 (58) | |
| No. (%) on oral CS | 58 (8) | 1 (1) | <0.05 |

TABLE 32

FURTHER MANAGEMENT

| | Cases seen by all other practitioners | Cases seen by X | p |
|---|---|---|---|
| No. (%) having no change made | 298 (43) | 45 (56) | <0.05 |
| No. (%) having therapy altered | 375 (53) | 34 (42) | |
| No. (%) referred to outpatients | 16 (2) | 0 | |
| No. (%) referred for emergency admission | 6 (1) | 2 (2) | |

TABLE 33

SPECIFIC CHANGES IN THERAPY

| | Cases seen by all other practitioners | Cases seen by X | p |
|---|---|---|---|
| No. having therapy altered | 375 | 34 | |
| No. (%) having inhaled drugs started or increased | 147 (39) | 23 (68) | <0.005 |
| No. (%) given oral corticosteroids | 55 (15) | 6 (18) | ns |
| No. (%) given antibiotics | 210 (56) | 6 (17) | <0.005 |
| No. (%) given oral bronchodilator | 138 (37) | 5 (15) | <0.01 |

# CHAPTER 8 - ASSESSMENT OF AN ASTHMA MANAGEMENT PROGRAMME FOR GENERAL PRACTICE


## SUMMARY

A survey of current general practice asthma management was performed before and after implementation of an Asthma Management Programme. The survey was carried out by recording details of asthma attendances to practitioners in five Glasgow Health Centres for the same two month period in two consecutive years. Repeat prescriptions for steroid inhalers and DSCG were also monitored. In the intervening period, practitioners in two of the five health centres (the Active Group) had access to a prepared programme of information on asthma management, health education material for their patients and peak flow meters presented at an open meeting with two local chest physicians. There was an increase in the use of inhaled steroids in the Active Group only, as judged by practitioners' opinions as to how, if at all, their practice had changed, and confirmed independently by monitoring repeat prescriptions. This group's use of antibiotics in the management of asthma decreased and there was an upward trend in the use of oral corticosteroids. No such changes were seen in the control group. This locally evolved programme of practitioner information and patient education material is, therefore, judged to be a moderate success and further use of it worthwhile.

## INTRODUCTION

Following the survey of current asthma management practice in the community described in Chapter 7, a programme of educational material and discussion for general practitioners and their patients which had been prepared was introduced to half of the survey population.

To assess whether this programme had had any measurable impact, its effect was monitored in four ways:-

1 By repeating the survey of asthma attendances.

2 By recording hospital attendances by patients of these practitioners.

3 By monitoring repeat prescriptions of specific asthma drugs.

4 By questioning practitioners themselves.

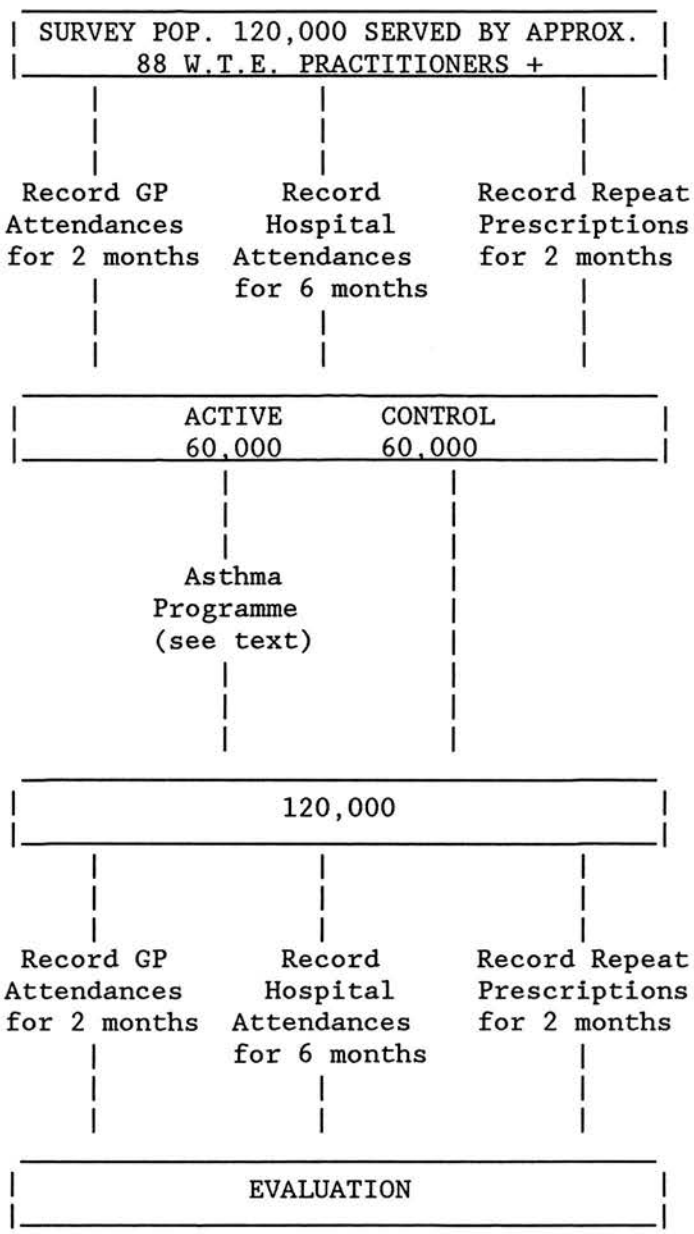
The full development and implementation of this programme and its evaluation are now described.

## METHOD

### 1 Patients

The general practitioners of five large health centres, two suburban and three serving inner city areas, with a patient population of 120,000, took part in the study. These health centres were chosen because they send patients to two participating general hospitals and because they could be

FIGURE 8: STUDY DESIGN




+ W.T.E. = whole time equivalent.

subdivided into two groups (one suburban plus one inner city, one suburban plus two inner city), equal in size. In addition these two subgroups refer patients to both of the participating general hospitals approximately equally, so that any change in one hospital's practice would not unduly bias the findings.

2 Study Design

This is shown in Figure 8. Information of the following three categories was recorded from all participating practices for two months in two consecutive years. In the interim half of the survey population (the Active Group) were introduced to the prepared asthma programme (see below).

The three categories of information were:-

(i) General practitioner attendances - the information described in Chapter 7 (Methods) was collected for attendances to general practitioners for asthma in September and October 1985 and 1986.

(ii) Hospital attendances of patients from these practices to the two local general hospitals and the city's children's hospital were monitored for six months (June - November 1985 and 1986). Casualty attendances and hospital admissions were recorded separately.

(iii) Repeat prescriptions for steroid inhalers (Becotide, Pulmicort, Becloforte, Bextasol, Ventide) and sodium cromoglycate (Intal) were monitored by clerical staff in two health centres, one each in the active and control groups in September and

October 1985 and 1986.

Finally, after each period of recording of consultations practitioners were asked to estimate the proportions of asthma cases in which they had been able to complete an encounter form. This was done by providing a visual analogue scale in the form

0 ------- 20 ------- 40 ------- 60 ------- 80 ------- 100%

After the second survey period, in November 1986, practitioners in the Active Group were sent a questionnaire designed to evaluate the various parts of the Asthma Programme. They were invited to assess the four elements of the programme on a scale of 0 - 3 (0 = unhelpful, 1 = not particularly helpful, 2 = of some value, 3 = very helpful). Further questions designed to determine any change in practice which the survey and Asthma Programme may have produced were also included.

3 The Asthma Management Programme

A programme of educational material and aids for the general practitioners of the Active Group health centres was prepared. This had four main elements:-

1 Information Folder for practitioners.

2 Asthma Education Leaflet for patients and/or parents.

3 Peak flow meters.

4 Meeting with local chest physicians.

The information folder (see Appendix 1) briefly described categories of asthma, and how to arrive at the diagnosis of asthma, based either on symptoms, simple measurements of peak flow rates, or response to bronchodilator or corticosteroids. Flow diagrams describing the local consensus opinion on the management of asthma in infants, children, adults and in emergencies were also provided.

An asthma education leaflet designed to increase patient's awareness of the disease process in asthma, the aims of treatment and signs of poorly controlled asthma was prepared with the technical help of the local Health Board's Health Education Department (see insert). As part of the development of this leaflet, its reading ease score was calculated. The average score for the text was 73, a reading ease level between that of the Sunday Post and Glasgow Herald which an estimated 80% of readers would understand.

Mini-wright peak flow meters were made available so that general practitioners could use them as frequently as they wished, either in the surgery or by asking patients to use them at home. These resources were presented to the practitioners of the two health centres at an open meeting given by two local chest physicians at which there was wide ranging discussion of the problems of asthma management in the community.

4 Statistical Analysis

Differences between groups were examined by Chi square testing, $p<0.05$ being taken as significant. Exact values for p are given where appropriate in the text. Averages were compared by Student's t-test.

A controlled evaluation of the effect of the management programme was therefore planned. However, the presence of a single practitioner with a special interest in asthma, whose management differed significantly from others (see Chapter 7) in one of the control group health centres was a confounding factor. For reasons discussed more fully in the next section this individual practitioner's results are not included in this part of the analysis.

RESULTS

(i) General Practitioner Encounters

The data is presented to show the practice in control and active groups in 1985 and 1986 in order that any secular trend be clearly separated from a change due to any effect of the Asthma Programme. As shown in Table 34, the practice of the practitioner with a special interest in asthma (X) did not change from 1985 to 1986. Since this practitioner's returns formed 26% of the control group total in 1985 and a much larger proportion (52%) in 1986, a discrepancy which falsely biases the control group figures, his returns have not been included in the results which follow.

FIGURE 9

## Frequency of attendances

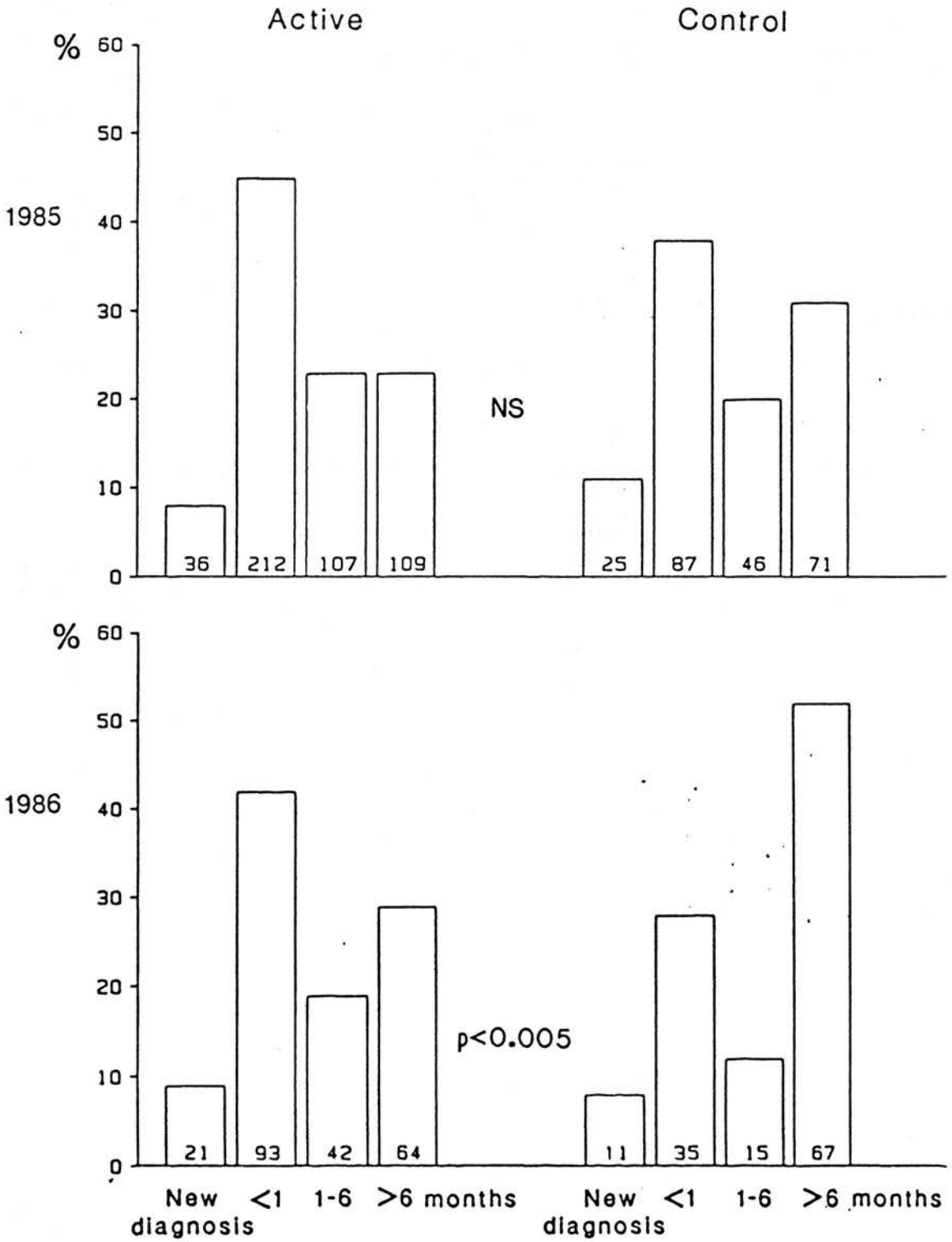


Table 35 shows the numbers of encounters due to asthma, the average age and some other characteristics of those encounters. Table 36 shows how many consultations resulted in changes in management and details some of these.

The number of encounter forms returned from the active and control group fell by about half from 1985 to 1986. There was little change in the practitioners' estimates of the proportions of actual cases seen in which a form was completed (see below) between 1985 and 1986 suggesting a genuine difference in consultation rate over these two months in 1985 and 1986. The average rate of acute asthmatic episodes reported to the Royal College of General Practitioners research unit in September and October fell from 24.7 per 100,000 in 1985 to 19.1 per 100,000 in 1986, suggesting that at least some of the observed decline was genuine.

Whereas in 1985 the proportions of cases seen at different time intervals and considered to be well controlled was similar in the active and control groups, by 1986, well after exposure to the Asthma Programme more cases were being seen at shorter time intervals (Figure 9 and Table 35) and more were considered well controlled in the Active Group (Figure 10 overleaf and Table 35). There was an upward trend in the use of inhaled steroids in both active and control groups in 1986 compared with 1985 suggesting a secular trend (Figure 11 and Table 35).

FIGURE 10: PROPORTION OF CASES JUDGED TO HAVE WELL CONTROLLED ASTHMA, 1985 AND 1986.

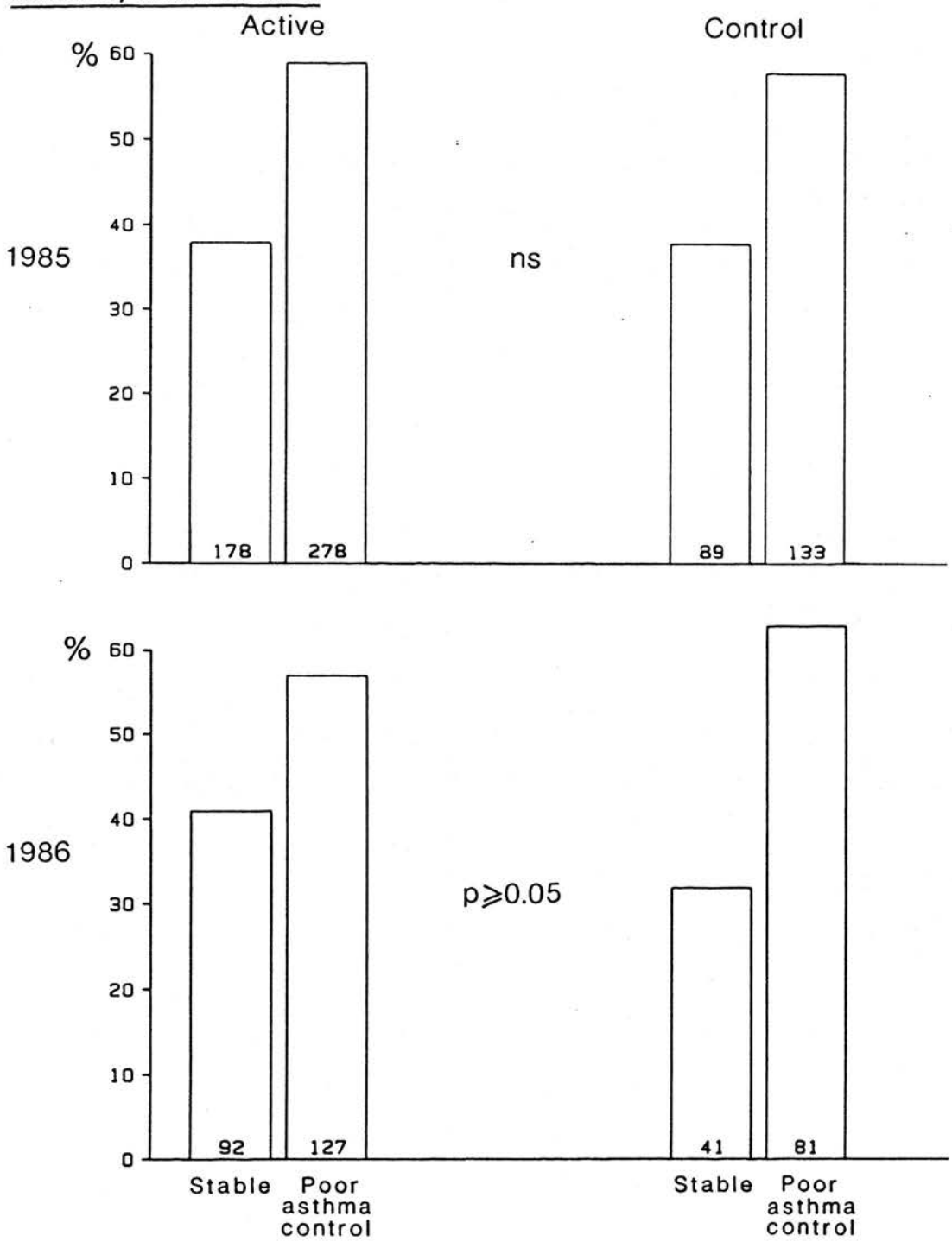


FIGURE 11

Current steroid therapy

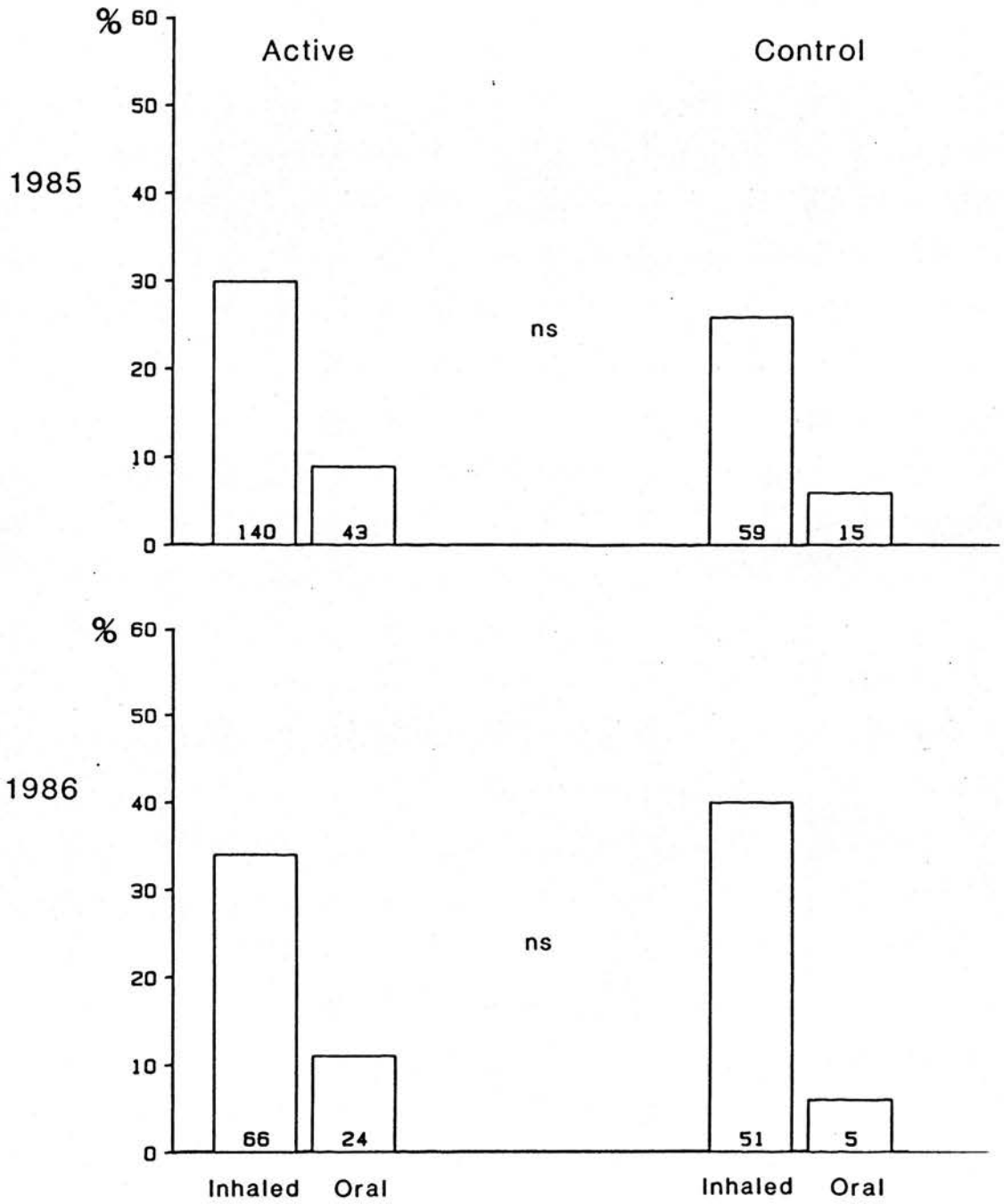
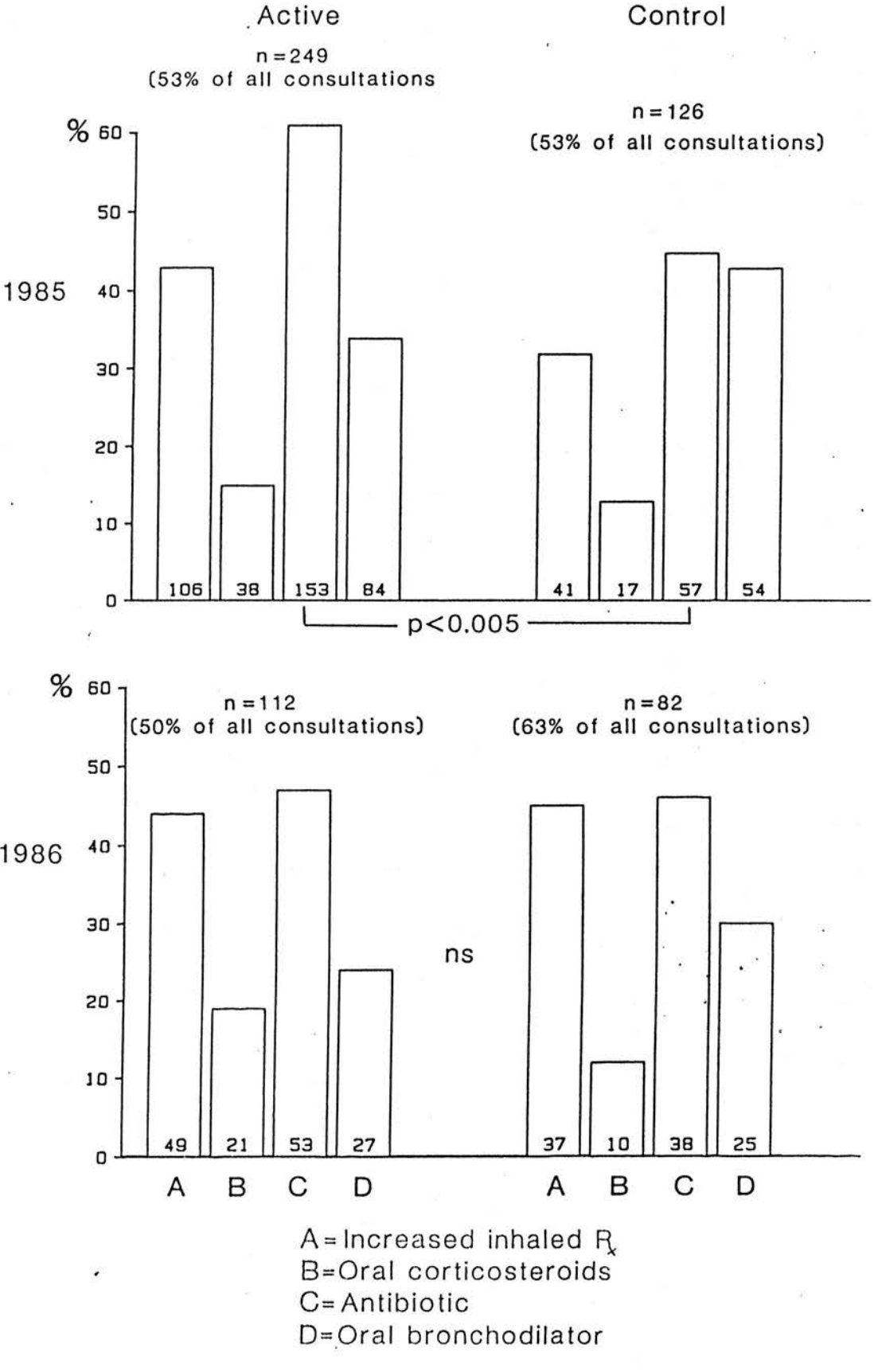


FIGURE 12

## Changes in therapy



In terms of therapeutic changes made (Table 36 and Figure 12) there was a significantly greater proportion of cases in the Active Group treated with antibiotics in 1985 which was eliminated in 1986. This was associated with an upward trend, not reaching statistical significance in the proportion of cases treated with a course of oral corticosteroids.

2 Hospital Attendances

There was an overall decline in the number of children seen at Accident and Emergency from 1985 - 1986, although no change in either group in the number of cases admitted. In terms of adult attendances, numbers in the study group increased somewhat compared with the control group (Table 37).

3 Repeat Prescriptions

The numbers of prescriptions for steroid inhalers and Intal given in September and October 1985 and 1986 in one health centre in each of the active and control groups are shown (Table 38 overleaf). Over this period there was no change in the repeat prescribing system in the health centre in the control group, whilst in the active group health centre the introduction of a computer-based system led to a 35% increase in all prescriptions issued between 1985 and 1986. The observed increases in prescriptions for steroid inhalers and Intal greatly exceeded this general increase, the difference remaining highly significant after taking this into account.

Although no figures for the total number of repeat prescriptions issued during the two survey periods were available in the

TABLE 38

REPEAT PRESCRIPTIONS OF ASTHMA DRUGS

| | Health Centre in Active Group | | Health Centre in Control Group | |
|---|---|---|---|---|
| | 1985 | 1986 | 1985 | 1986 |
| No. of steroid inhalers | 72 | 165* | 57 | 50 |
| No. of Intal inhalers | 8 | 34* | 13 | 10 |
| Total no. of repeat prescriptions | 5,876 | 7,928 | See Table 39 | |

* p <0.005

TABLE 39

VARIATION IN REPREAT PRESCRIPTION NUMBERS WRITTEN MONTHLY IN THE CONTROL GROUP HEALTH CENTRE

| Month | No. of Repeat Prescriptions |
|---|---|
| November 1986 | 3,517 |
| December 1986 | 3,762 |
| January 1987 | 3,352 |
| February 1987 | 3,345 |
| March 1987 | 3,414 |
| April 1987 | 3,465 |
| May 1987 | 3,369 |
| Average | 3,460 |
| Maximum Variation i.e. $\frac{\text{max-min}}{\text{average}} \times 100\%$ | 12% |

control group health centre these were monitored for the subsequent seven months (November 1986 - May 1987). As shown in Table 39 this showed a maximum variation in the total number of repeat prescriptions written of 12%. As stated already, there was no change in this health centre in the numbers of prescriptions for asthma specific inhalers issued.

4 General Practitioners Views of the Survey and Asthma Programme

The number of practitioners who returned estimates for the proportion of cases for whom an encounter form had been completed fell from 1985 to 1986. The estimated proportions, however, remained constant (Table 40 overleaf).

Nineteen of the 36 practitioners in the Active Group (53%) returned the questionnaire designed to evaluate their opinions of the elements of the Asthma Programme.

The average rating for the meeting with local chest physicians was 2.7, for the information folder 2.3, the patient education leaflet 2.2 and the readily available peak flow meters 2.5. Most felt that exposure to the programme had altered their management of asthma to some extent (5/19 "a lot", 13/19 "a little", 1/19 "not at all").

Specific questioning about four categories of asthma drugs revealed that this had resulted in an increase in the use of inhaled steroids, with no perceived change in use of inhaled sympathomimetics, oral steroids or theophyllines.

TABLE 40

PRACTITIONERS' ESTIMATES OF PROPORTIONS OF ASTHMA CASES SEEN IN WHICH AN ENCOUNTER FORM WAS COMPLETED

| | 1985 | 1986 |
|---|---|---|
| No. (%) of practitioners who replied | 65 (66) | 48 (48) |
| Average estimate of proportion of cases documented | 56% | 54% (Active Group 58%) (Control Group 50%) |

DISCUSSION

This investigation represents an attempt to measure the effect of a defined programme aimed at improving asthma care in a large population. It is important to differentiate the attempt at measuring the effect from any perhaps longer term change the programme may have had that could not be measured. Other projects of a similar nature may have experienced this same difficulty (Modell, 1983; Hilton, 1986a). Surveying such a large population restricts the investigator to event recording - general practitioner attendances, repeat prescriptions, hospital visits. These describe some episodes in the life of an asthmatic but do not monitor his every day level of asthma control. This is obviously more important but probably impossible to measure on such a large scale.

Thus an asthmatic may tolerate symptoms of troublesome asthma for a long time, attend his practitioner with uncontrolled asthma, be started on an inhaled steroid and have a much improved quality of life, whilst still suffering a further exacerbation one year later. This would not necessarily be recorded as any improvement by the indices measured, unless he were receiving a repeat prescription, although it would represent a real improvement for that individual.

Some positive pointers of improved outcome are observed, even given these insensitive measuring tools. Practitioners themselves felt that their management of asthma had altered and independently identified an increased use of inhaled steroids as the major part of this. This reflects a similar emphasis in the

information folder.

Although this was not reflected by any change in the proportion of cases receiving inhaled steroids over the two month periods during which practitioner attendances were monitored there was a substantial increase in the repeat prescribing of inhaled corticosteroids only in the active group health centre. The static proportion of attending patients receiving inhaled corticosteroids could reflect the pattern of patient initiated consultations in general practice with patients tending mainly to see their doctors when unwell. The figures obtained do not deny the possibility of an increased proportion of stable asthmatics not seen within that two month period, who in fact may only have registered in the repeat prescription figures.

The increase in repeat prescriptions of steroid inhalers and DSCG, and practitioners' independent assessment that their use of inhaled steroids had increased was associated with the lesser use of antibiotics and an upward trend in the use of oral corticosteroids in the management of unstable asthma. This suggests a change in thinking about the underlying pathological process away from bacterial infection which is a positive trend (Marks, 1983; Levy, 1984; Seaton, 1978).

Others have commented on the importance of obtaining information on all events when an audit of any kind is made (Sheldon, 1982). This is self evident. It has been suggested that systems which bypass the doctor's participation, although not his co-operation, are preferable and that data from committed clerical staff is of

higher calibre. By this token the data on repeat prescribing should be most reliable, and it is, therefore, noteworthy that a significant change in practice was observed here. There is no reason to believe that omissions in the practitioners' returns occurred on any but a random basis, with perhaps a tendency for emergency house calls to be under-represented.

The proportion of cases in which a new diagnosis of asthma was made in the course of the survey was consistently higher in both active and control groups at around 10% than in X's practice (2%) (Table 34). This may represent a longer term benefit of the survey both in the active and control groups due to a general raising of consciousness of asthma as an entity. This phenomenon was also observed by Modell (1983); in that study 92 asthmatics were followed up with interviews a year apart. These represented 63% of all asthmatics identified from their practice disease register. In addition, however, in the course of that study a further 66 new asthmatics were identified. As already mentioned, in children at least it has been shown that naming the condition as asthma is a major determinant of giving appropriate treatment (Anderson, 1981; Speight, 1983).

The slight increase in casualty attendances by patients of the active group health centre may reflect an increased awareness of the significance of their symptoms. The lack of change in the number of hospital admissions with acute asthma suggests that the programme had not sufficiently altered the general level of asthma control in the test population. However acute deterioration in asthma can have many causes, only some of which may be preventable.

The programme consisted of four main elements, as described. From practitioners' comments and by observing the use made of peak flow meters and patient education leaflets it was apparent that these two elements were less frequently used than anticipated. Thus although many workers have commented on the usefulness of the peak flow meter as a tool (Seaton, 1978; Cushley, 1983) one can only presume that the programme failed to persuade practitioners of this in everyday practice, either as a tool for themselves or for their patients to use at home. In addition relatively few patients received copies of the patient education leaflet, although the feedback from those who had received it was favourable.

In summary, therefore, an attempt was made to improve communication between doctors and between doctors and patients about asthma and its treatment, by means of a locally agreed programme. Its implementation was monitored and several positive trends observed, particularly in terms of an increased use of inhaled corticosteroids. The high proportion of reported cases in which a new diagnosis of asthma was made suggests a long term benefit of the study which was not further evaluated.

Practitioners value discussion and consultation with local hospital specialists and dissemination of information by this means has been shown by this investigation to be beneficial and worthwhile.

TABLE 34

CONSULTATIONS BY THE PRACTITIONER WITH A SPECIAL INTEREST IN ASTHMA, 1985 AND 1986

| | 1985 | 1986 | |
|---|---|---|---|
| n | 81 | 140 | |
| Average age (years ± ISD) | 45.8 ± 23.2 | 45.5 ± 21.3 | |
| Interval Since Last Seen | | | |
| New diagnosis, no. (%) | 2 (2) | 4 (3) | ) |
| < 1 month no. (%) | 62 (77) | 95 (68) | ) ns |
| > 1 month no. (%) | 16 (20) | 40 (29) | ) |
| Not stated no. (%) | 1 | 1 | |
| Reasons for Attendance (See Text) | | | |
| Routine, good control (1), no. (%) | 43 (53) | 78 (56) | ) |
| Poorly controlled (2, 3 or 4), no. (%) | 37 (46) | 60 (43) | ) ns |
| Not stated, no. (%) | 1 | 2 | ) |
| Current inhaled steroid, no. (%) | 42 (58) | 74 (62) | ns |
| Current regular oral steroid, no. (%) | 1 (1) | 2 (1) | |
| Changes in Management | | | |
| None, no. (%) | 45 (56) | 77 (55) | ) |
| Change therapy, no. (%) | 34 (42) | 58 (41) | ) ns |
| Refer to OPD, no. (%) | 0 (0) | 2 (1) | ) |
| Refer for admission, no. (%) | 2 (1) | 1 (1) | |
| Specific Therapeutic Changes (as % of those whose therapy was changed) | | | |
| No. (%) | | | |
| Increase inhaled Rx | 23 (68) | 38 (66) | |
| Course of oral corticosteroids | 6 (18) | 15 (26) | |
| Course of antibiotics | 6 (18) | 8 (14) | |
| Oral bronchodilator | 5 (15) | 6 (10) | |

TABLE 35

PATIENT AND CONSULTATION CHARACTERSITCS

| | 1985 | | 1986 | |
|---|---|---|---|---|
| | Active | Control | Active | Control |
| n | 470 | 231 | 223 | 129 |
| Average age (years ± ISD) | 39.6± 23.7 | 38.2± 22.5 | 38.2± 23.9 | 39.6± 22.7 |
| Interval Since Last Seen (No. %) | | | | |
| Diagnosed this visit | 36 (8) | 25 (11) | 21 (9) | 11 (8) |
| < 1 month | 212 (45) | 87 (38) | 93 (42) | 35 (28) |
| 1-6 months | 107 (23) | 46 (20) | 42 (19) | 15 (12) |
| > 6 months | 109 (23) | 71 (31) | 64 (29) | 67 (52)+ |
| Not stated | 6 | 2 | 3 | 1 |
| Reason for Attendance (No. %) | | | | |
| Routine, adequate control (1) | 178 (38) | 89 (38) | 92 (41) | 41 (32)* |
| Poorly controlled (2, 3 or 4) | 278 (59) | 133 (58) | 127 (57) | 81 (63) |
| Emergency (4 only) | 73 (15) | 12 (12) | 30 (13) | 23 (18) |
| Not stated | 14 | 9 | 4 | 7 |
| Current Steroid Therapy (%) | | | | |
| None | 264 (56) | 136 (59) | 124 (56) | 64 (50) |
| Inhaled | 140 (30) | 59 (26) | 66 (34) | 51 (40) |
| Regular oral | 43 (9) | 15 (6) | 24 (11) | 5 (4) |

+ $p < 0.005$

* $p > 0.05$ ($X^2(obs) = 5.907$, $X^2(0.05) = 5.99$).

TABLE 36

MANAGEMENT OF ASTHMA

| | 1985 | | 1986 | |
|---|---|---|---|---|
| | Active | Control | Active | Control |
| n | 470 | 231 | 223 | 129 |
| No. (%) | | | | |
| No change in treatment | 202 (43) | 96 (42) | 100 (45) | 45 (35) |
| Change in treatment | 249 (53) | 126 (53) | 112 (50) | 82 (63)+ |
| Refer to outpatients | 10 (2) | 6 (3) | 7 (3) | 0 (0) |
| Refer for admission | 4 (1) | 2 (1) | 2 (1) | 1 (1) |
| Changes in Treatment (% of those whose treatment was changed) | | | | |
| n | 249 | 126 | 112 | 82 |
| No. (%) | | | | |
| Increase inhaled Rx | 106 (43) | 41 (32) | 49 (44) | 37 (45) |
| Oral corticosteroids | 38 (15) | 17 (13) | 21 (19) | 10 (12) |
| Antibiotics | 153 (61) | 57 (45)* | 53 (47) | 38 (46) |
| Oral bronchodilator | 84 (34) | 54 (43) | 27 (24) | 25 (30) |

* $p < 0.005$

+ $p < 0.05$

TABLE 37

HOSPITAL ATTENDANCES FOR ASTHMA

| | 1985 | | 1986 | |
|---|---|---|---|---|
| | Active | Control | Active | Control |
| A and E Attendances | | | | |
| Adults | 16 | 12 | 27 | 11 |
| Children | 20 | 8 | 4 | 1 |
| TOTAL | 36 | 20 | 31 | 12 |
| Hospital Admissions | | | | |
| Adults | 26 | 14 | 26 | 8 |
| Children | 8 | 8 | 7 | 7 |
| TOTAL | 34 | 22 | 33 | 15 |

# CHAPTER 9 - CONCLUSIONS

These studies were initiated in an environment, more fully outlined in Chapter 1, where asthma mortality rates in the U.K., and elsewhere, had remained unaltered over the thirty years which had seen the introduction of oral and inhaled corticosteroids and inhaled beta agonists. Surveys of deaths from asthma had shown that preventable factors could often be shown in retrospect to have contributed to death with under-treatment, under-supervision and often poor understanding of the nature of the disease. Surveys of childhood asthma had shown under-diagnosis and under-treatment to be common, and a cause of preventable morbidity, but large cohort of adult asthmatics had not been assessed in a similar manner.

The pilot retrospective survey (Chapter 2) suggested that under-treatment and under-supervision was occurring in a significant proportion of adult asthmatic hospital admissions, a finding recently corroborated by Osman (1987). This pilot study also helped define the aims and methods of the prospective audit (Chapters 3-6). It was felt important that this audit should be non-interventionist, not least because this allowed the full approval of all medical units in the hospital. This limited the measures of outcome which could be made to some extent. In the final analysis, however, a critical assessment of current symptoms may well be at least as useful as a single peak flow recording or set of pulmonary function tests (often performed under variable, or unknown bronchodilator cover).

The crucial step of case-finding was performed by daily contact with medical and nursing staff responsible for emergencies over the previous 24 hours. In this way a cohort of patients was identified prospectively and then characterised in terms of previous asthma severity and treatment, hospital management, understanding of disease and treatment and outcome. Such a cohort has not previously been described. The 81% follow-up rate allows the conclusions drawn to be applied more widely.

The observation that many patients (at least 34%) had continuing symptoms of poor asthma control confirms other evidence that the period immediately after hospital discharge with asthma is an unstable one: several studies of deaths from asthma have commented on the 10-20% who die shortly after discharge from hospital (MacDonald, 1976b; Ormerod, 1980). It raised the possibility that under-treatment and under-supervision was occurring and led to the comparative studies outlined in Chapters 4-6. These showed that general medical units with one respiratory physician attached and middle grade "respiratory" staff made a specific diagnosis of asthma, used inhaled and oral corticosteroids and monitored response to therapy by peak flow recordings more often and supervised patients more closely after discharge, than did general medical units with other specialist bias. That the management of such units differed was not of itself surprising, but that this should be so sharply related to outcome in two comparable groups of patients is an indication for properly used modern, asthma therapy. It shows that preventable morbidity is occurring on a regular basis. Even amongst those admitted to medical units with a specialist respiratory interest

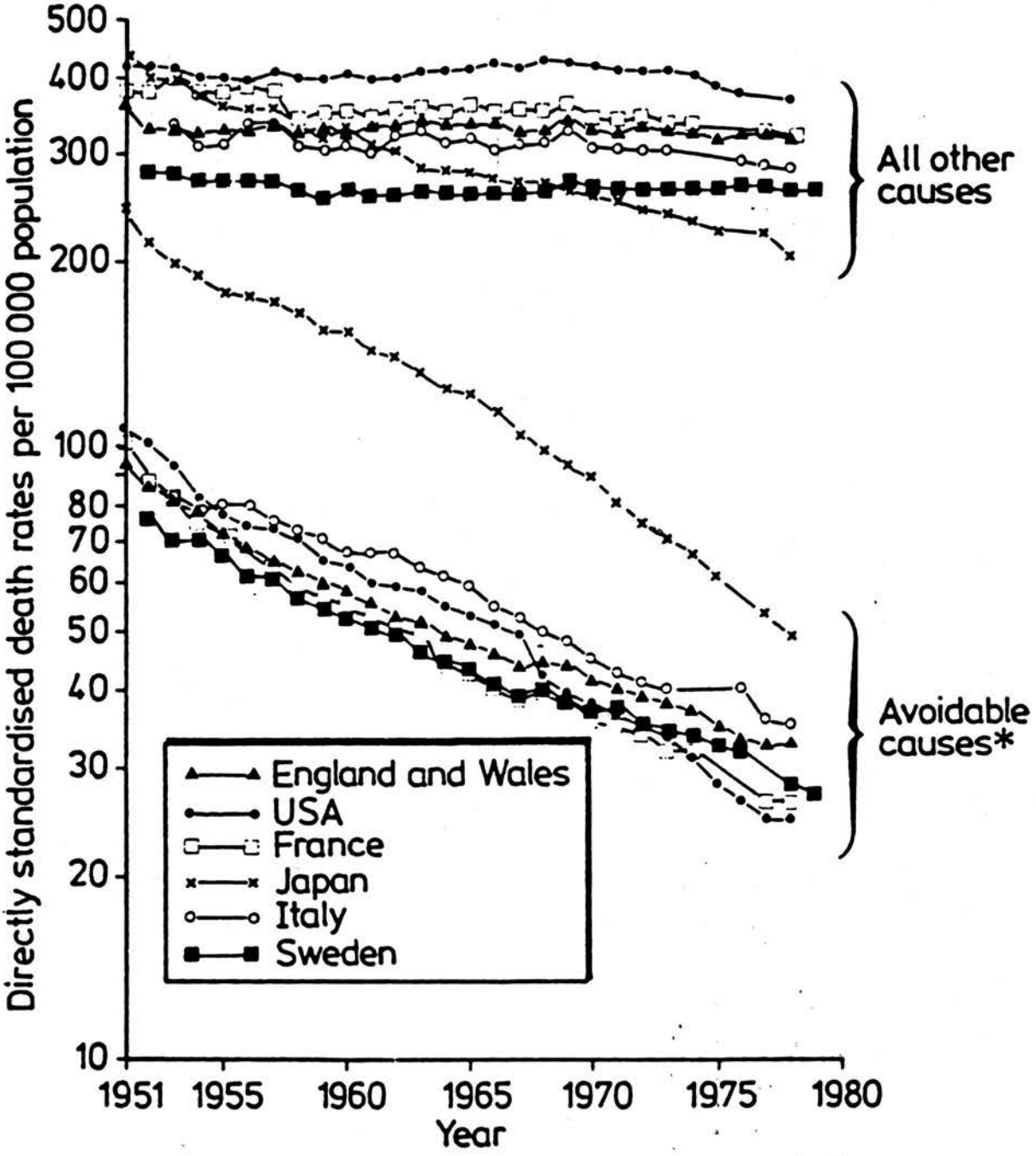
23% reported regular sleep disturbance due to wheeze since hospital discharge. Until it is proven that such a proportion of cases cannot be further improved, these figures do not allow complacency even on the part of such units.

The findings that the major differences between those subsequently re-admitted compared with others lay in the under-use of oral and inhaled corticosteroids after discharge from hospital, and in a longer time interval to planned review emphasis the importance of close supervision of this unstable period when the risk of death from asthma may be greater.

Comparison of previous history and of management and outcome variables between those labelled asthma and COAD showed that older males with no objective pulmonary function data recorded were more likely than others to acquire the latter less precise diagnostic label. Although such a diagnosis was not associated with differences in the use of oral or inhaled corticosteroids compared with those labelled asthmatic, it was associated with the lesser use of peak flow recordings to monitor progress - perhaps perpetuating the problem. The possible under-diagnosis of asthma in older males reporting symptoms of variable wheeze (similar to those reported by females with asthma) was also reported in the long term follow-up study of respiratory morbidity underway in Tucson, Arizona (Dodge, 1986).

The conclusions of the community survey of asthma management (Chapter 7), which was also entirely non interventionist but accumulated data on a large number of consultations, show a

FIGURE 13 (from Charlton, 1986)




Comparison between trends in aggregate of avoidable causes of death* and all other causes (ages 5-64).

*Includes tuberculosis, cervical cancer, chronic rheumatic heart disease, hypertension, stroke, appendicitis and cholelithiasis and cholecystitis.

noticeable congruity with the hospital-based data. In both hospital and general practice those with an interest in asthma and, therefore, presumably more aware of current specialist practice were found to use oral corticosteroids for exacerbations of asthma and long term inhaled corticosteroids more frequently and to review patients more often. These similarities raise the possibility that interested physicians perceive the long term nature of adult asthma and the need for a long term view.

Asthma has been identified (Rutstein, 1976) as a condition which is amenable to treatment and by corollary as a suitable marker of quality of delivery of health care. In many developed countries morbidity from other such marker conditions (including tuberculosis, cervical cancer, chronic rheumatic heart disease, hypertensive disease, stroke, appendicitis and cholelithiasis) has declined dramatically over the thirty years to 1980 (Figure 13) (Charlton, 1986).

The recent observations that the prevalence of asthma may in fact be increasing (Fleming, 1987) could partially explain why asthma mortality has not declined. The work described in this thesis provides other evidence as to why mortality has not altered.

Finally, in Chapter 8 evidence is presented that by local discussion and dissemination of information doctors' management of asthma can be changed. The increase in repeat prescribing of inhaled steroids and cromoglycate is taken as a positive outcome. This survey was population-based (comparing two groups of approximately fifty practitioners and 60,000 patients). It was

not possible to incorporate any measurement of symptomatic improvement in this survey. However, the benefit of inhaled corticosteroids over bronchodilators and other more symptomatic treatment has recently been studied prospectively over a prolonged period (Horn, 1988).

The re-education of the medical profession about asthma first suggested in 1978 by Seaton and re-iterated by Osman (1987) remains a priority. The data presented here provides a firm body of prospectively gathered objective data to underpin that assertion and provide some evidence how this can begin to be achieved.

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(5) . APPENDIX 1

CAS
Off

ASTHMA AUDIT - DISCHARGE SUMMARY & CASE RECORD INFORMATION

NAME: Helen HOSP. NO. 91834R

ADDRESS: Penzance Way Rochdale

DATE OF BIRTH: 29/12/57 (Ventilated)

LENGTH OF HOSPITAL STAY (DAYS) 8

DELAY - DISCHARGE SUMMARY (DAYS) 2 months.

SEEN BY GP OR DDS BEFORE ADMISSION: GP / (DDS) / NO

TREATMENT BEFORE ADMISSION: i.v. steroids
i.v./i.m. Theophylline
SC Terbutaline or equivalent
None

REASON FOR DETERIORATION NONE.

DURATION POOR ASTHMA CONTROL Sudden. 5 hrs. ↑ wheeze & SOB over 3-4 months.

INITIAL PULSE RATE (0-200) 110 bpm. 40 on Paradox

INITIAL PEFR (0-500) 0 = not recorded
10 = unrecordable 0

LUNG FUNCTION MONITORED: PFTs / PEFR / (NO).

SKIN TESTS POS / NEG / NOT KNOWN

ARTERIAL GASES CHECKED NO / $pO_2$ ≥60 / $pO_2$ <60 $pCO_2$ 58 $pO_2$ 5.

STEROIDS: Oral / iv bolus / oral + iv / iv infusion / nil

AMINOPHYLLINE: bolus / infusion / nil

$O_2$ ventilated & IPPV (Bennett. NONE / 24% / 28% / 35, 40% / >40%

CHANGE IN TREATMENT ON DISCHARGE: Increase oral Rx
Increase inhaled Rx
Decrease inhaled Rx
Decrease oral Rx
No change
Other

CT Nuelin SA 250 bd

SPECIFY: Becloforte 3×4 Ducrant 2×4 PN. Disgree

INHALER TECHNIQUE CHECKED: YES / (NO)

HOME ON STEROIDS: (YES) / NO DOSE: 20mg

FOR HOW LONG: DAYS (0-30) _____
TILL SEEN GP/CLINIC
LONG TERM

for 5 days, reduce 10mg for 5 days, then stop.

CLINIC REVIEW INTENDED: RESP / MED / NO

WEEKS: 2

BDA: Status asthmaticus

DD. Status asthmaticus: Resp. failure: Assisted ventilation.

# ASTHMA AUDIT - RECENT INPATIENT QUESTIONNAIRE

DATE SEEN: 2/12/85. SURVEY NUMBER

NAME: _____ UNIT NO

ADDRESS: Penfence Way. GRI NO

DOB: 29/12/57

SEX: MALE / FEMALE

1 SMOKER: (N) / Y / EX Code: 0 /1 /2

2 DATE OF DISCHARGE: 17/11/85.

3 LENGTH HOSPITAL STAY (DAYS) 8

JOB HISTORY: Enrolled Nurse. Receptionist/Typist.

4 OCCUPATIONAL ASTHMA: (No) / Poss / Prob / Definite (0 1 2 3)

5 HOW LONG HAVE YOU HAD ASTHMA? ½.
Childhood [98]/ late onset (years)/New diagnosis [99]

6 PREVIOUS HOSPITAL ADMISSIONS (Number) 6

7 EXACERBATIONS IN PAST YEAR - GP ATTENDANCE: (Number) 2. 1.

8 HISTORY OF SUDDEN SEVERE ATTACK: (NO) / YES

9 PREVIOUS PFTs: (NO) / YES / GRI

10 REGULAR FOLLOW-UP BY GP: (NO) / YES

11 REGULAR HOSPITAL CLINIC ATTENDANCE FOR ASTHMA: (NO) / YES

12 TREATMENT BEFORE ADMISSION: Theophylline - Slophyllin. Ventolin inhaler.

13 PROPHYLACTIC Rx BEFORE ADMISSION: (NO) [0]
Inhaled Steroid [1]
Intal [2]
Steroid [3]

14 HOW REGULARLY TAKEN (Estimate days/week full dose taken) /

15 ARRANGEMENT TO START STEROIDS IN EVENT EXACERBATION: (NO) / YES

16 If so, Starting Dose PN (0 - 50 mg) /.

17 HOW LONG HAD CHEST BEEN GETTING WORSE BEFORE ADMISSION (days) 1

18 HAD YOU ATTENDED GP: (NO) / YES

19 TREATMENT STARTED: [0] (No)
[1] Antibiotic
[2] Bronchodilator
[3] Steroid
[4] Antihistamine
[5] Other

20 SEEN BY GP OR (DDS) BEFORE ADMISSION: NO / (YES) / PHONED IN
No=0; Seen by GP=1 Phoned in by GP=3
" " DDS=2 " " DDS=4

21 TREATMENT THEN: (Nil) [0]
Injection [1]
Tablets [2]

DDS came ~~[illegible]~~ gave tablets? type. Called again.

22 TESTS IN HOSPITAL: (NO) / PEFR / PFTs
0 1 2

23 BLOOD GASES CHECKED NO / Can't remember / (YES)
Yes 0 1 2

24 Do you remember this being painful? NO / (YES) / Not applic.
0 1 9

25 INHALER TECHNIQUE CHECKED: NO / (Dr) / Nurse / Can't remember
0 1 2 3

26 EXPLANATION OF DRUG ACTION: (NO) / YES / Can't remember
0 1 2

27 STEROIDS GIVEN (Tabs) NO / (YES) / Can't remember
0 1 2

28 DOSE AT TIME OF DISCHARGE: 0-50mg / Don't know / Not applicable
20mg. 98 99

29 HOW LONG BEFORE STEROIDS TO BE STOPPED: 0 - 30 days (10 days.
99 = no instructions
98 = longterm Rx

30 ANY CHANGE IN REGULAR TREATMENT? NO / YES (NO = 0; YES = 1)
Code: 1=increased
2=decreased

1 Theophylline
CT. 2 Inhaled B2 agonist } Ventolin 2×4.
1 3 Inhaled Atrovent }
4 Inhaled CS - low dose
1 5 Inhaled CS - high dose 3×3
6 Intal
7 Oral steroids

31 FOLLOW-UP APPOINTMENT: NONE / GP / MED / RESP
0 1 2 3

32 WEEKS 3.

33 WOULD YOU RECOGNISE BAD ATTACK AGAIN NO / (YES).
Mention - sleep disturbance (NO) / YES
- increased BD usage (NO) / YES
- BD less effective (NO) / YES
OTHER: Tightness. NO / YES

34 WHAT WOULD YOU DO? 1 Routine GP visit
2 Emergency GP call
3 Hospital
4 Start course of steroids
5 Other _____

35 CURRENT Rx & MODE OF ACTION: No idea [0]/ Some [1]/ Wrong [2]
1 Inhaled B2 agonist } ✓
2 Atrovent
3 Inhaled CS ✓.
4 Intal
5 Oral steroid ✓.
6 Theophylline / oral B2 agonist

36 OTHER Rx Antibiotic + Cough bottle since discharge from GP.

37 CURRENT SYMPTOMS Sleep disturbance (NO) / YES
Morning tightness NO / (YES).
Wheeze climbing 1 flight stairs (NO) / YES

38 Do you feel your asthma treatment is causing any side effects? (Specify) _____

CODE: (0=) None
1= Side effects appropriate to Rx
2= Side effects inapproriate to Rx

39 INHALER TECHNIQUE: (Good) / Fair / Poor
Code: 0 1 2

40 HOW IS YOUR CHEST NOW:
Worst ever best ever

APPENDIX 2

GLASGOW ASTHMA ENQUIRY

General Practice Return

Gorbals Health Centre

This form should be completed for each asthmatic patient attending FOR TREATMENT OF HIS ASTHMATIC CONDITION.

PATIENT'S INITIALS: ..... DATE: .....

SEX: ..... AGE: .....

TIME INTERVAL SINCE LAST CONSULTATION:

- Diagnosed at this consultation ☐
- 1 – 3 days ☐
- 4 – 6 days ☐
- Less than 2 weeks ☐
- Less than 1 month ☐
- Less than 6 months ☐
- More than 6 months ☐

REASON FOR ATTENDANCE:

- Routine, adequate control ☐
- Routine, inadequate control ☐
- Exacerbation, non-urgent consultation ☐
- Exacerbation, urgent consultation ☐

IS PATIENT RECEIVING STEROID THERAPY?

Regular Oral ☐ Intermittent oral ☐ Inhaled ☐

PEFR: .....

ACTION:

- Continue as before ☐
- Change regime ☐ → Decrease inhaled treatment ☐
  - Increase inhaled treatment ☐
  - Oral corticosteroids ☐
  - Antibiotic ☐
  - Oral bronchodilator ☐
  - Injected $R_x$ ☐
- Refer OPD ☐
- Refer for admission ☐

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APPENDIX 3

# Management of asthma in hospital: a prospective audit

C E BUCKNALL, C ROBERTSON, F MORAN, R D STEVENSON

**Abstract**

**In a prospective study of management of asthma in hospital patients with acute asthma admitted to a single hospital over a calendar year were surveyed. Altogether 157 out of 194 admissions (81%) were studied. The patients (16 of whom had been admitted twice and one three times) were interviewed at home about two weeks after discharge, and their hospital records were reviewed. When interviewed an appreciable proportion of patients said that their asthma had been poorly controlled after their discharge from the hospital: 54 reported regular sleep disturbance due to wheeze, 78 tightness of the chest in the morning, and 77 wheeze after climbing one flight of stairs. Patients had been described on admission as having had symptoms of deteriorating asthma for a median of three days. Closer questioning of 71 patients, however, elicited that 50 had had regular symptoms indicating poor control for weeks or months. Most patients did not know how their drugs worked, and many did not have an appropriate plan of action in the event of a further attack. In all the cases studied 114 patients were treated with oral corticosteroids, only 70 had had their previous maintenance treatment increased at the time of discharge, and 107 had a follow up appointment booked for an average of three and a half weeks after discharge.**

**These findings show that undersupervision and undertreatment of patients with asthma are common and not confined to those dying of the condition.**

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## Introduction

Mortality from asthma is either static[1] or rising in Britain,[2] with about 2000 deaths a year. Oral and inhaled corticosteroids and $\beta_2$ agonists, which are effective in treating asthma, have not had any impact on this figure. Several surveys of deaths from asthma have found that some factors are preventable.[3-5] For example, in the British Thoracic Association's survey of deaths from asthma in two regions of England such factors existed in 77 of 90 cases: corticosteroids and bronchodilators were underused, patients were poorly supervised, and both patients and doctors underestimated

 

the severity of the fatal attack and delayed summoning help.[5] A leading article on asthma in *Thorax* in 1978 said, "in almost no other field is the gap betweeen diagnostic and therapeutic knowledge and its general application so great."[6]

We observed in our general clinical practice that many of these factors also applied to patients treated for acute attacks of asthma in hospital and sent home. A pilot retrospective survey of admissions for asthma to our hospital during 1983 suggested that corticosteroids were being underused in the management of asthma in hospital, many patients were discharged without any change in pre-existing treatment, and supervision of patients after the acute attack was inadequate.[7] This survey also confirmed previous reports of resistance to use of the peak flow meter, an objective measure of airflow obstruction.[5,8]

The effect of differing management regimens on outcome cannot be studied retrospectively, nor will all cases of asthma necessarily be surveyed; thus we carried out a prospective audit of management of asthma.

## Patients and methods

All cases of acute asthma (and episodes of wheezing illness in non-smokers) were identified daily by staff on the general medical wards to which patients were admitted as emergencies. A patient in either of these categories was approached by one of us (CEB), who explained the nature of the survey, obtained consent to visit the patient at home about two weeks after discharge, and obtained the agreement of the patient's general practitioner. In the patient's home a semistructured interview lasting 20-30 minutes was carried out, covering a check list of some 40 items. A detailed description was obtained of the patient's history of asthma and previous treatment; events leading up to the admission to hospital; management in hospital and immediately after discharge; current symptoms of asthma; understanding of the condition; and drugs given for treatment. After about two months the case notes were reviewed and details of the severity of asthma, its management, and supervision of the patient obtained.

Information was stored on a VAX-VMS computer and data analysed with the statistical package for the social sciences (SPSSX).

## Results

Of 194 admissions eligible for inclusion in the study, 157 (81%) were followed up. The patients not followed up comprised three who died (average age 66); nine transferred within 24 hours to an adjacent chest unit; nine not seen at home as arranged (who failed to respond to a follow up telephone call or letter); four from outside Glasgow; one whose general practitioner refused permission for the study; one confused with coexisting cerebrovascular disease; one transferred to long term geriatric care; three who were readmitted to other hospitals before interview; and two vagrants admitted on six occasions largely for social reasons. Six patients who were interviewed but were found subsequently to have evidence in their case notes excluding reversibility of their airflow obstruction (usually details of a negative result of a trial of steroids) were excluded from the study.

Admissions of 139 patients over a full calendar year were investigated. Sixteen patients were admitted twice and one three times (157 admissions). The average age of the patients was 47·9 (SD 19·9) years. Altogether 70% were non-smokers.

The patients' hospital records were augmented by review of records from the asthma clinic to corroborate the diagnosis of asthma made by the team on the admitting ward. In all, 97 patients had objective evidence of reversible airflow obstruction (77 had a clear history and in 20 with a doubtful history a trial of steroids had yielded a positive result). A further 38 were lifelong non-smokers with a clear history of episodic wheeze typical of asthma. Eighteen had a doubtful history of wheeze and no data on lung function. Notes were not available for four patients.

In 141 admissions (90%) the patients had received treatment for their asthma before admission to hospital, inhaled $\beta_2$ agonists being the commonest (133 patients). Of the 96 patients taking long term treatment, two took sodium cromoglycate alone, one sodium cromoglycate and oral steroids, six oral steroids alone, 34 oral and inhaled steroids, and 53 inhaled steroids alone. Of the 90 taking either regular inhaled steroids or sodium cromoglycate, 29 remembered to take the full daily dose less than five times a week. Only 21 patients had an arrangement to start oral corticosteroids if their asthma deteriorated, with an average starting dose of 31 mg (range 5-60 mg). Fifty one had had a sudden, severe attack (developing within one hour, not helped by inhalers, and requiring medical attention) within the past three years. The median number of previous admissions to hospital with asthma was one (range 0-50, with 12 patients recalling an undefined large number of admissions). The median number of visits to general practitioners in the preceding year for exacerbations of asthmatic symptoms was three (range 0-12, four patients recalling an undefined large number of visits). Fifty six patients attended a hospital asthma clinic, 41 attended their general practitioner regularly, and some of these patients attended both.

### EVENTS LEADING TO HOSPITAL ADMISSION

On interview patients reported that their asthma had deteriorated over a median of three days (range 0-42) before admission; 56 said that their symptoms had deteriorated over less than 24 hours. In the hospital's case notes deterioration over a median of three days (range 0-42) was recorded in 139 cases; for the remaining 18 deterioration for "weeks" before admission was recorded. On close questioning many patients disclosed that their asthma had been poorly controlled for a long time and that initially they had described deterioration that had been the "final straw."[9] This was formally assessed in the final 71 patients interviewed: 21 had had episodic symptoms, but the others had had regular symptoms of poor control, seven patients for weeks and 43 for months before being admitted to hospital.

Seventy patients had sought help from their general practitioners at the onset of the episode leading to admission to hospital, and for 64 of these some change in treatment had been made; 42 had been given antibiotics, 28 a course of oral corticosteroids, and 11 oral bronchodilators. Immediately before admission 87 patients had been seen by either their regular or an emergency general practitioner, who treated 44, most commonly with intravenous aminophylline.

### ASSESSMENT AND MANAGEMENT IN HOSPITAL

Review of case records showed that the average pulse rate on admission to hospital was 110 (SD 19) beats/minute and that 68 patients had a pulse rate over 110 beats/minute. Only 20 had peak flow rate recorded as part of the initial assessment, though subsequent recordings were made for 84 patients. Arterial gases were analysed in 117 patients, of whom 44 had an oxygen pressure of less than 8 kPa.

All patients used nebulised bronchodilators regularly during their stay in hospital. Oral corticosteroids were given to 114 patients and 32 did not receive any steroids. When steroids were to be continued after discharge (110 cases) the average daily dose of prednisolone on discharge was 18 mg. Forty seven patients were given aminophylline and 96 antibiotics. Of 94 who received oxygen, only 25 were treated with high flow (at least 35%) oxygen.

At interview 97 patients reported that their use of an inhaler had been checked in hospital but only 32 recalled being given some explanation of their drug treatment. Fifty one patients said that their treatment had not been changed on discharge, and this was confirmed from their case records. The dose of oral or inhaled drugs, or both, had been reduced for 30 patients. Hospital review was planned for 107 cases, to take place an average of 3·5 (SD 2·0) weeks later.

The diagnosis of acute asthma was recorded on the discharge summaries for only 83 of the 157 cases (53%), even though the medical and nursing staff reported all these patients to us as having asthma. In 135 (86%) cases a diagnosis of reversible airflow obstruction or episodic wheeze in lifelong non-smokers had been recorded previously. In two cases the diagnosis was asthma and bronchitis, and in 46 it was exacerbation of chronic obstruction airways disease. Various other diagnoses were recorded for nine patients and none for 12; notes were not available for five.

### PATIENTS' UNDERSTANDING OF THEIR ASTHMA AND TREATMENT

As an earlier interview may influence patients' subsequent understanding of their drug treatment we assessed only first admissions (n=139) in this section. One hundred and thirteen patients thought that they would recognise a bad attack of asthma in the future, usually on the non-specific basis of increasing wheeze and tightness of the chest. Only 10 patients spontaneously mentioned sleep disturbance, six increased use of bronchodilators, and 18 decreasing efficacy of inhaled bronchodilators as specific signs of worsening asthma. Eighty seven patients said that they would either call their doctor in an emergency or, depending on the severity of the attack, go straight to hospital, but 47 had no appropriate plan of action for a further attack. On specific questioning 21 said that they had arrangements to start a course of oral steroids, but only two volunteered that this would be their response to a further attack.

The table shows the numbers of patients taking drugs when interviewed.

*Patients' understanding of treatment of their asthma*

| Category of drug | No (%) taking drug (n=139) | No (%) of those taking drug with: Some idea of action of drug | No idea of action of drug | Wrong idea of action of drug |
|---|---|---|---|---|
| $\beta_2$ Agonists: | | | | |
| Inhaled | 131 (94) | 54 (41) | 73 (56) | 4 (3) |
| Oral or theophylline | 62 (45) | 11 (18) | 51 (82) | |
| Corticosteroids: | | | | |
| Inhaled | 100 (72) | 32 (32) | 61 (61) | 7 (7) |
| Oral* | 65 (47) | 7 (11) | 55 (85) | 3 (5) |
| Ipratropium | 23 (17) | 8 (35) | 15 (65) | |
| Sodium cromoglycate | 3 (2) | 1 (33) | 2 (66) | |

*Includes some patients finishing a short course of oral steroids.

Most had no idea how their drugs worked, in particular whether they were quick acting or had a long term effect.

### CONTROL OF ASTHMA AFTER DISCHARGE FROM HOSPITAL

Regular sleep disturbance after their discharge from hospital was reported by 54 patients, regular tightness of the chest requiring them to use their bronchodilator before rising from bed by 78, and wheeze on climbing one flight of stairs by 77. Analysis with the $\chi^2$ test of the 62 patients who reported no sleep disturbance or tightness of the chest in the morning and the 95 patients who did showed these two groups to be broadly similar in age and severity of previous asthma. Significantly more patients without symptoms ($\chi^2=6{\cdot}4$, df=1, $p<0{\cdot}01$) had been looked after in general medical wards with an interest in respiratory diseases.

## Discussion

This is the first prospective survey of management of asthma in hospital to be reported and included 81% of all admissions for asthma to a single hospital over a calendar year. Assessments were performed in the patients' homes by a physician with experience of managing asthma. Most of the patients had clear histories, and most had objective evidence of reversible airflow obstruction and could be clearly differentiated from patients with an exacerbation of chronic bronchitis with minor wheeze. They had moderately severe asthma, with 61% receiving long term inhaled or oral corticosteroids. In this respect they were broadly similar to the patients in the British Thoracic Association's study, 62 (69%) of whom had been receiving such treatment.[5]

Several characteristics of the patients deserve mention. Only 13% had been instructed to start taking oral steroids if another severe attack occurred but only 1% mentioned steroids when specifically asked what they would do in a severe attack. Only a few patients had peak flow meters to use at home, although 32% gave a history of sudden severe attacks. Compliance of patients was judged to be fair. Less than half had been to see their general practitioner during the index attack; a common reaction of patients was that such attacks had to be tolerated and would settle with time. Indeed, 34% had no appropriate plan of action in the event of a further attack. Most patients had little understanding of the way in which their drugs could be expected to help them. These findings are similar to those of a survey of patients at an asthma clinic in Aberdeen[10] and enlarge the finding of the British Thoracic Association that patients dying of asthma underestimated their disease and delayed calling help.[5]

Forty per cent of those who saw their practitioner were given steroids before admission to hospital and 80% received them in hospital. Instructions about dosage after discharge seemed to have been adequate, but corrective and maintenance treatment may have been inadequate as a large proportion of patients had nocturnal and early morning asthma and reduced exercise capacity at interview.

A retrospective survey of management of asthma in hospitals has shown differences between general physicians and those specialising in diseases of the chest.[11] Significantly more of our patients who did not have symptoms of asthma at interview had been managed in medical wards with an interest in respiratory diseases. This finding, more fully documented elsewhere,[12] suggests that corrective and long term treatment may be better in such wards.

Both general and hospital practitioners continue to be pre occupied with bacterial infection in asthma: 66% of patients were given antibiotics at home and 61% in hospital despite good evidence that such treatment has no effect on the duration and severity of an attack of asthma.[13] Only a small proportion of patients were treated with high flow oxygen (27% of those receiving oxygen), and very few had peak flow measured as part of their initial assessment.

The previous regular treatment in 51% of cases was unaltered or even reduced after discharge from hospital. The median duration of increasing symptoms recorded in hospital was three days whereas 70% of patients admitted on direct questioning to symptoms of poor control for weeks or months before admission. These findings suggest that an inappropriately short term view of the illness was being taken. The time to follow up—an average of three and a half weeks for those patients given appointments—disregards the possibility of symptoms recurring as the dose of oral steroids is decreased.

This study shows that asthma is often poorly treated in general medical units, with inadequate attention being paid to the importance of pre-existing poor control, to improvement of lung function and treatment, and to the continuing close supervision of patients in an unstable phase of their disease. Management is individual both to patients and, to some extent, to physicians. Broad generalities do, however, exist, and most physicians specialising in respiratory diseases would agree that acute asthma should be treated with high flow oxygen, nebulised bronchodilators, and oral corticosteroids and that peak flow measurements provide an important objective measurement of airflow obstruction.[14]

Comparisons are sometimes made between asthma and diabetes in the chronicity of disease and in treatment. Patients need to understand their condition and be able to react appropriately. This survey shows that the management of asthma, however, is often a reaction to the extreme event of status asthmaticus, and the idea of fine tuning of asthma control to achieve the respiratory equivalent of normoglycaemia is almost entirely neglected.

Long term undertreatment and undersupervision have been identified as the most important factors in preventing deaths from asthma. Our survey shows that such suboptimal management practices are common even in hospital, where a high awareness of modern treatment would be expected. We believe that extrapolation of these results might explain the apparent failure of new and effective drug treatments to reduce the mortality from asthma.

We acknowledge the support of the medical and nursing staff of the medical wards, especially those who received acute medical admissions; the patients who gave their time; and Irene Adams, who processed the manuscript.

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# Hospital Practice

## DIFFERENCES IN HOSPITAL ASTHMA MANAGEMENT

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***Summary*** Asthma management was audited prospectively for one year in a large teaching hospital. Full details were available on 77% of all patients admitted, or readmitted, with asthma during that year (150 of 195 admissions). 64 patients were admitted to general wards with a special interest in respiratory medicine, and 86 to general wards without this specialist interest. Cases in the two groups were similar in terms of age, previous severity of asthma, previous treatment, and initial pulse rate. Fewer cases in the non-specialist group were treated with oral corticosteroids (67%, vs 83%), had regular peak flow recordings (42%, vs 73%), or were given return appointments (56%, vs 92%); and fewer had their regular inhaled therapy increased after discharge (28%, vs 55%). At interview 13 days later, more patients from the non-specialist group reported sleep disturbance (41%, vs 23%), morning chest tightness (55%, vs 37%), or wheeze on 1 flight of stairs (58%, vs 34%). 20% of first admissions in the non-specialist group were readmitted within the year, compared to 2% of the group treated on wards with a specialist interest in respiratory medicine. These data suggest that the intensive management of asthmatic patients, practised in respiratory units, prevents much unnecessary morbidity.

### INTRODUCTION

DIFFERENCES in asthma mortality rates between specialist thoracic and general medical units have been known for ten years.[1-3] A retrospective sample of asthma cases cared for in thoracic and general units in 1978 showed that respiratory physicians used more objective measurements of disease severity and of response to therapy, and prescribed inhaled drugs after hospital discharge more often than general physicians.[4]

Asthma mortality rates in the UK may be static,[5] or increasing[6]—but the mortality rates have not fallen over the past 20 years, despite major advances in therapy. However, evidence from national morbidity surveys in general practice suggests that the annual period prevalence of asthma is rising,[7] and Hay and Higenbottam have suggested that asthma morbidity is declining owing to the greater use of inhaled corticosteroids and sodium cromoglycate.[8]

We report on a prospective survey of hospital asthma management in which we were able to assess the management, supervision, and outcome of patients looked after by general medical units with, and without, a specialist respiratory interest.

### PATIENTS AND METHODS

The Glasgow Royal Infirmary has 4 general medical units which receive emergency medical admissions on a 1 in 4 daily rotation. 2 of these units have a specialist respiratory physician on the staff. Between June 1, 1985, and May 31, 1986, patients who were admitted with acute asthma, or non-smokers with episodes of wheezing illness, who were reported by the admitting firm, were included in a prospective survey of the management that they received in hospital and after discharge, and its effect on their symptoms after discharge. Patients were approached during their stay in hospital by one of us (C. E. B.), who obtained permission to visit them at home 2 wk after discharge—with no further involvement in their management, or knowledge of their treatment. At the home interview, a record was taken of the patient's asthma history, previous treatment, events leading up to the last admission, drug treatment and symptoms after discharge from hospital, and their understanding of the condition and medications. After a further 2 mo, the hospital case notes were reviewed and details of the management and supervision of the hospital admission were obtained.

TABLE I—PATIENT CHARACTERISTICS ON ADMISSION TO HOSPITAL

| — | Group R n = 64 | Group G n = 86 |
|---|---|---|
| Average age, yr (SD)* | 44·3 (18·7) | 50·6 (20·4) |
| *Diagnostic category:* | | |
| Patients in groups i + ii | 49 (77%) | 63 (73%) |
| Patients in group iii | 7 (11%) | 11 (13%) |
| Patients in group iv | 8 (12%) | 12 (14%) |
| % Smokers (non-, ex-)* | 31% (39,30%) | 28% (44,28%) |
| Patients on steroids—any form—before admission | 35 (60%) | 55 (64%) |
| Previous hospital admissions (SD)* | 3·0 (7·7) | 3·9 (8·1) |
| Exacerbations in past yr (SD)* | 3·5 (5·4) | 3·9 (3·9) |
| Length of exacerbation before admission, d (SD) | 5·1 (5·4) | 3·9 (4·9) |
| Initial pulse rate, beats/min (SD) | 109 (18·1) | 111 (20·6) |

*Based on first admission only.

The certainty with which a diagnosis of asthma could be made varied from patient to patient. We defined 4 categories:

i. Patients with a clear history of episodic wheeze and pulmonary function tests showing reversible airflow obstruction, whether smokers or non-smokers.

ii. Patients with a clear history of episodic wheeze, but without records of pulmonary function, who were lifelong non-smokers.

iii. Patients with a less certain history of wheeze, but who had pulmonary function tests showing evidence of reversible airflow obstruction; most of this group were smokers or ex-smokers.

iv. Patients with a less certain history of wheeze, and no pulmonary function test results; most of these were smokers or ex-smokers.

Data were stored on a VAX-VMS computer and further analysis was made by use of SPSS-X. Chi-squared analysis was used to test the null hypothesis that there was no difference between the two groups. A small, non-significant difference in age was observed between patients admitted in the two groups: because of this, a case-control analysis was also performed. Pairs of patients were matched between the two groups, and results were analysed as described by Breslow and Day.[9]

### RESULTS

195 patients with symptoms appropriate for inclusion into the study were admitted during the year, but only 157 cases were interviewed at home, of whom full details were available on 150 (77%). We have no reason to suspect that the other patients were unrepresentative; full details of the trial protocol will appear elsewhere (Bucknall CE, et al. *Br Med J.* (In press).

64 patients were admitted to general wards with an interest in respiratory medicine (group R), and 86 patients (57%) to general wards without this specialist interest (group G). The two groups of patients were similar: 47% of each were males, and no significant difference was observed for diagnostic category, or other variables as shown in table I.

Differences in diagnosis, management, and supervision within hospital are shown in table II. Differences in

permitted additives, for example; these include "immortelle absolute", a product promising more than it can deliver. In 1983 the committee had been wary of the claim that passive smoking was associated with lung cancer. No longer: they now conclude, along with the US Surgeon General and others, that the risk is real. The rate of lung cancer in non-smokers rises by 10–30% on regular exposure to other people's smoke. Whether this increase is "small" or not, it means that the annual incidence in non-smokers aged 35 or more would rise from 10 to 11–13 per 100 000. The range may reflect current British expert opinion on the matter[6,7] but it seems generally acceptable. To this burden other health effects must surely be added.

The Government, no enemy of the tobacco barons, sees the report as reflecting "established policies of voluntary arrangements". Not everyone is so content with those arrangements, not even the chairman of the committee which monitors them.[8] Nor is Sir Peter, who disburses, via a controversial trust, up to £1 million of tobacco money per annum. The voluntary agreements stop him supporting all the research he would like to.

## IS ROUTINE URINALYSIS WORTHWHILE?

URINALYSIS and urine microscopy have become accepted as an essential part of clinical assessment; until lately, the value of their routine use in all new patients had not been questioned publicly. Private doubts about the value of routine microscopy are manifested by the difficulty in finding a functioning microscope in wards other than those devoted to urology or nephrology. Urinalysis, which is usually undertaken by the clinic nurse and therefore occupies no medical time, has not been subject to the same pressures and therefore survives in most hospital patient assessments. When urinalysis and microscopy are specifically indicated by the patient's history or the findings on examination the yield of information is high and the value of urine testing is not questioned.[1] However, it has now been suggested that the yield from routine testing in patients without specific indication is low and insufficient to justify the not inconsiderable expense.[1,2] At first sight, it may seem that the cost of screening is negligible since the appropriate dipstick costs only about 9 pence and unstained bright-field microscopy takes no more than a few minutes of physician time. More careful analysis suggests that the true cost in UK may not be very different from the American figure of $22 per test,[1] since collection and testing of urine specimens has been shown to occupy 6·5% of a district nurse's time,[3] and preparing a specimen for microscopic examination takes several minutes of a physician's time. Thus, there is a case to answer—is the cost worthwhile?

The major argument against routine testing is the observation[1,2] that although abnormalities are found in approximately a third of tests, the therapeutic yield is very small, leading to change of treatment in only 1–2% of patients. Moreover, initially abnormal tests that subsequently reverted to normal could lead to additional investigations which are expensive and potentially hazardous. Two assumptions in this argument should be challenged. The first is that it is possible to separate by means of the average clinical history and examination, in as reliable way as did the panel of experts in the study by Akin et al,[1] patients in whom urinalysis was indicated for diagnostic purposes (high yield) from those in whom it was not (routine testing, low yield). Surely in clinical practice it is better to do urinalysis in all patients as a double check against having missed a clue to a relevant disease in the history or examination. The second assumption is that the discovery of an abnormality is of no importance if it does not lead to useful corrective treatment. Whilst it may be true that symptomless urinary tract infection should not be treated, knowledge of its presence may be useful in guiding future treatment or as an indication for further investigation or follow-up. Similarly, there may be no curative treatment for glomerulonephritis, but control of hypertension is probably valuable in slowing progression of renal damage;[4] detection of proteinuria or haematuria is therefore useful in selecting patients who require long-term surveillance even if the severity of the haematuria or proteinuria is not itself considered sufficient to warrant renal biopsy.

Whatever the pros and cons of urinalysis and microscopy, its survival in a particular doctor's routine practice will depend on the yield he sees in his patients. In patients admitted to a general medical ward it is likely to be high: Akin and colleagues[1] found abnormalities in 57%. In the general population it is much lower: 2·5% of men undergoing routine health screening were found to have haematuria;[5] approximately 5% of women of childbearing age have significant bacteriuria;[6] and proteinuria is present in 0·6–5·8% of adults[7] and diabetes in about 1·3%.[8] Overall, in a survey of patients in general practice, 11% of males and 18% of females had urinary abnormalities,[10] most of which were detected by urinalysis rather than microscopy.

Thus the prevalence of urinary abnormalities is sufficiently high to justify routine urinalysis both in hospital and in general practice, although it must be remembered that abnormal findings should be confirmed before further investigation is undertaken. What about a crusade for routine screening microscopy? The answer is probably not. It has been suggested that ". . . microscopic urinalysis be omitted if the macroscopic urinalysis to include normal colour, clarity and reagent-strip testing is negative in an asymptomatic individual";[11] this seems a reasonable compromise in view of the small probability of missing an important abnormality in such patients. The crusade should be to persuade doctors to carry out urine microscopy in patients in whom it is indicated.


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TABLE II—HOSPITAL DIAGNOSIS, MANAGEMENT, AND SUPERVISION

| — | Group R n=64 | Group G n=86 | 95% Confidence Intervals |
|---|---|---|---|
| *Treatment in hospital (%):* | | | |
| Oral corticosteroids | 53 (83) | 58 (67)* | 2·5%, 29·5% |
| Antibiotics | 35 (55) | 61 (71) | −31·5%, 0% |
| Aminophylline | 20 (31) | 25 (29) | — |
| *Supervision (%):* | | | |
| PEFR ± spirometry | 47 (73) | 36 (42)† | 15·9%, 46·1% |
| Blood gas analysis | 50 (78) | 65 (76) | — |
| Inhaler technique assessed | 46 (72) | 45 (52)* | 6·2%, 33·8% |
| Explanation of drug action | 18 (28) | 12 (14)* | — |
| *Diagnosis at Discharge (%):* | | | |
| Asthma | 41 (64) | 43 (50) | — |
| COAD | 10 (16) | 36 (42)† | −39·8%, −12·2% |
| Other | 13 (20) | 9 (10) | — |

*p < 0·05; †p < 0·005.

treatment, supervision, and outcome on discharge from hospital are shown in tables III and IV. Cases in group R were significantly more likely to be treated with oral corticosteroids, and to have peak flow rates or spirometry monitored ($p < 0.005$). No difference in the frequency of arterial blood analyses was observed. Significantly more cases in group R had inhaler technique checked, although no difference in the proportions of patients judged to have either good or fair inhaler technique was found at the interview. More cases in group R remembered being given some explanation of the action of drugs prescribed. A highly significant difference ($p < 0.005$) was found between proportions of cases with no planned review appointments. No differences between the groups were seen for changes in oral therapy after discharge, but a greater proportion of cases in group R had inhaled therapy increased at the time of discharge ($p < 0.005$). The differences in management between the two groups were associated with significantly fewer asthmatic symptoms reported by group R (table IV). 17 patients had more than one admission to hospital with acute asthma during the year: 15 (88%) of these were first admitted to medical wards with no specialist respiratory interest (group G): thus 20% of cases first admitted to group G were readmitted to hospital within the year, compared with 2% for group R ($p < 0.005$).

A highly significant difference ($p < 0.005$) was seen in the proportions of cases described as acute asthma or an exacerbation of chronic obstructive airways disease (COAD) (table II), despite the fact that all cases were initially reported as acute asthma or wheezing illness in non-smokers. In addition, the proportions of cases in the various categories of diagnostic certainty for asthma were similar for the two groups (table I), suggesting that these diagnoses were being used indiscriminately in group G.

TABLE III—MANAGEMENT AFTER DISCHARGE FROM HOSPITAL

| — | Group R n=64 | Group G n=86 | 95% Confidence Intervals |
|---|---|---|---|
| Increased oral treatment (%) | 17 (27) | 16 (19) | — |
| No change oral treatment (%) | 43 (67) | 57 (66) | — |
| Increased inhaled treatment (%) | 35 (55) | 24 (28)* | 8%, 46% |
| No change inhaled treatment (%) | 22 (34) | 41 (49) | — |
| No review planned (%) | 6 (9) | 39 (44)* | −47·6%, −22·4% |
| Wk to review, if planned (SD) | 3·3 (1·7) | 4·15 (2·2) | — |
| % reviewed within 2 wk | 36 | 15† | 6·4%, 35·6% |

*p < 0·005; †p < 0·025.

TABLE IV—DIFFERENCES IN SHORT AND LONG TERM OUTCOME

| — | Group R n=64 | Group G n=86 | 95% Confidence Intervals |
|---|---|---|---|
| *At follow-up interview:* | | | |
| Sleep disturbance (%) | 15 (23) | 35 (41)* | −32·6%, −3·4% |
| Morning tightness (%) | 24 (37) | 47 (55)* | −33·8%, −2·2% |
| Wheeze on 1 flight stairs (%) | 22 (34) | 51 (58)† | −39·6%, −8·4% |
| First admissions | 57 | 76 | |
| Readmissions in survey yr (%) | 1 (2) | 15 (20)† | |

*p < 0·05; †p < 0·005.

TABLE V—ANALYSIS OF 51 MATCHED PAIRS

| — | No of discordant pairs | p |
|---|---|---|
| Oral corticosteroids given | 15, 5 | < 0·05 |
| Lung function monitored | 19, 4 | < 0·005 |
| Admissions diagnosed as asthma, vs COAD | 12, 2 | < 0·005 |
| Sleep disturbance at interview | 5,17 | < 0·025 |
| Morning chest tightness | 6,16 | = 0.06 |
| Wheeze on 1 flight of stairs | 7,19 | < 0·05 |
| Clinic review planned | 24, 4 | < 0·0005 |

The first number gives pairs with the variable present in group R but not in group G; the second gives pairs with the variable present in G but not R. (Thus in 15 pairs oral corticosteroids were given to the patient in R, but not to the corresponding matched patient in G; in 5 pairs they were given to the patient in G but not to the one in R; in the other 31 pairs both patients received the same treatment.)

In view of the small, though non-significant, difference in age between the two groups, with older patients in group G, cases admitted to group R were matched with suitable group G cases, that allowed an analysis of 51 matched pairs to be made (68% of the sample). The results of this case-control analysis confirm the previous findings: differences between the two groups remained significant except that there was no discordance between pairs in terms of increases in inhaled treatment at discharge, or of morning chest tightness at interview (table V).

## DISCUSSION

This survey shows major differences in the management of asthma between units with and without a specialist respiratory interest, and that these differences affect outcome. Differences in mortality rates have been commented on in previous surveys of hospital asthma deaths[2,3] and differences in management in a retrospective sample of asthma admissions,[4] but no prospective survey of asthma admissions has previously been reported. The findings of Osman et al[4] are strikingly similar to our own: the passage of 7 years has apparently had little effect on poor asthma management practices.

The cases represent 77% of all acute asthma admissions over a calendar year, the majority having objective evidence of reversible airflow obstruction in addition to histories of episodic wheeze. They can be clearly distinguished from cases of chronic bronchitis with mild associated wheeze: it is disturbing, therefore, that general medical units appear to be reluctant to make a positive diagnosis of asthma. Speight and co-workers[10] surveyed school children with asthma and found that a failure to use the term asthma was associated with underuse of specific asthma treatment. Our findings suggest that use of the label COAD, rather than asthma, is particularly associated with differences in supervision in hospital and after discharge, although the lesser use of oral corticosteroids in non-respiratory medical units applied both to those labelled asthma and COAD. Non-respiratory medical units are less inclined to use peak flow recordings, and we also found a high proportion of cases discharged without follow-up appointments. These differences are

associated with a significant excess of short and long term morbidity, with more patients reporting symptoms of poor asthma control soon after discharge, and more readmitted to hospital within the year.

This survey provides unequivocal evidence that asthma is often poorly managed in hospital, and that such poor management practices, which may occasionally contribute to death,[11] are the cause of a great deal of preventable morbidity. Ten years have passed since the management of asthma in general medical units was called into question: the answers are known, but have yet to be generally applied.

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# Clinical Practice

## DIAGNOSIS AND TREATMENT OF CORONARY DISEASE: COMPARISON OF DOCTORS' ATTITUDES IN THE USA AND THE UK

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***Summary*** Two panels of doctors, one in the USA and one in the UK, were asked to indicate how appropriate they judged a series of possible indications for coronary angiography and coronary artery bypass graft (CABG) operations. "Appropriateness" was defined with respect to possible benefit to the patient and excluded considerations of cost. The indications were presented as a series of detailed clinical situations in which the procedure might be used, and for each indication individual panel members rated appropriateness on a scale of 1 to 9. The US panel judged more indications appropriate than did the UK panel, and there was more agreement among the members of the US panel than among those of the UK panel. Although the two panels tended to rate the appropriateness of the indications in the same order, the UK panel placed more emphasis than did the US panel on the importance of symptoms and the amount of medical treatment. Application of the panels' ratings to two groups of patients who had had coronary angiography showed that 17% and 27% of the investigations had been inappropriate by the standards of the US panel, whereas 42% and 60% were inappropriate by the UK panel ratings. 13% of the CABG operations studied were inappropriate by the US and 35% by the UK panel ratings.

### INTRODUCTION

SPENDING on health care differs widely in the developed world, and some of the largest differences are found between the USA and the UK. For example, in 1985 the rate of coronary artery bypass graft (CABG) operations per million population was 1000 in the USA and 210 in the UK (ref 1 and Trent Regional Health Authority, unpublished). This disparity cannot be explained by differences in the prevalence of coronary disease in the two countries, and whether the operation is overused in the USA or underused in the UK is not clear. Do doctors in the two countries have a different perception of the value of the operation to the patient or does the difference in CABG rate reflect the availability of resources? To explore the difference in the use of coronary angiography and CABG in the USA and the UK we have examined the attitudes of panels of physicians and surgeons from the two countries. We have used our findings to assess whether the use of these procedures was appropriate in three groups of American patients.

### METHODS

#### *Assessment of Appropriateness*

We developed "appropriateness ratings" for possible clinical indications for coronary angiography and CABG. From published work we assessed the circumstances in which each procedure had proved effective and we took account of its risk.[2,3] From this review and from discussions with clinicians, we devised for both coronary angiography and CABG a comprehensive series of clinical situations (brief case histories) in which the use of each procedure might be considered. Patients were categorised according to hypothetical clinical situations or indications with respect to symptoms, past medical history, medical treatment, and the results of investigations. In each case, the information was detailed enough that patients with the possible indication could be seen to be reasonably homogeneous and the procedure would be equally appropriate (or inappropriate) for all of them. The list of case histories included all the possible indications that might arise in practice, but was short enough to allow the panelists to score their ratings of appropriateness within a reasonable time.

The possible indications for each procedure were organised according to clinical settings in which the procedure might be used; in most cases these corresponded to major symptoms such as those seen in chronic stable angina or to clinical situations such as those arising after acute myocardial infarction. Within each clinical setting we created possible indications by permuting factors such as the severity of angina, the degree of medical therapy, and the results of exercise tests; thus 300 possible indications for coronary angiography and 480 for CABG were devised. Table 1 shows examples of the case histories; a complete list of these indications has been published elsewhere.[2,3]

In each country, we convened a panel of doctors to rate the possible indications. Each panel used the same 9-point scale of appropriateness, where 9 = highly appropriate, 5 = equivocal, and 1 = highly inappropriate. We defined appropriateness as the extent to which the perceived benefit of a procedure exceeds the expected

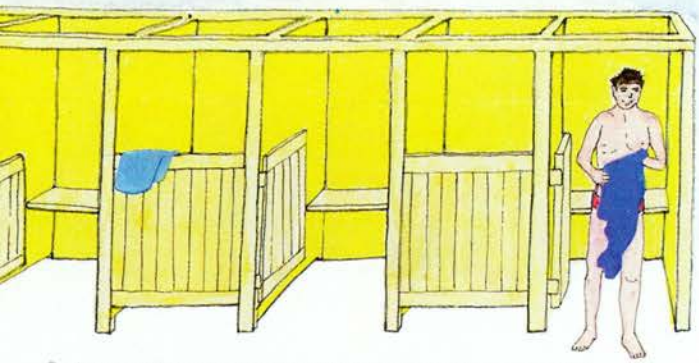
# ASTHMA

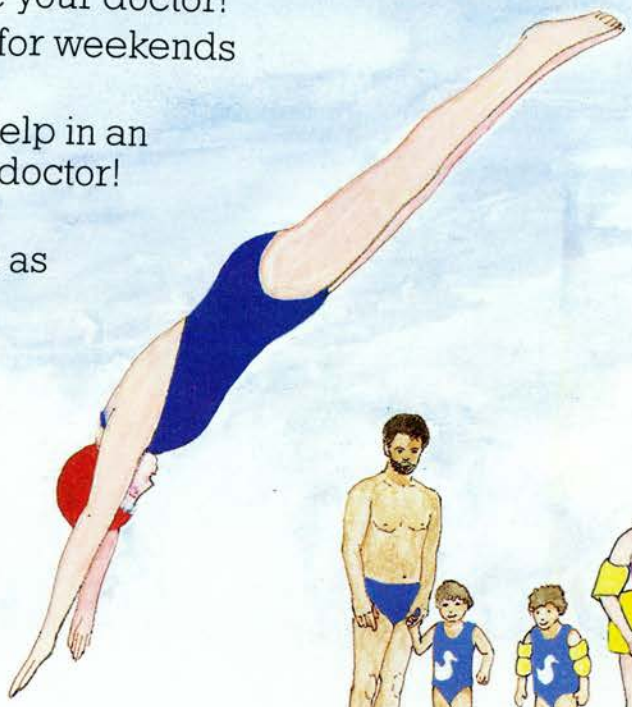


Get a lift from modern treatment –
asthma's not what is used to be!

## Remember —

- To take your medicine regularly!
- Don't alter or stop your treatment!
- If your wheeze comes back see your doctor!
- Always have enough medicine for weekends and holidays!
- If your Bronchodilator doesn't help in an attack, don't delay! Phone your doctor!
- Exercise is good for you — with treatment you can play as much as your pals!





Swimming (in a heated pool) is a good form of exercise.

Points to remember reproduced by kind permission from 'THE WINNER' comic for the asthmatic child


# Asthma

**What is Asthma?** It is a condition in which there is difficulty moving air in and out of the lungs. This is because the bronchial tubes, which carry air into the lungs, become narrowed at times. This narrowing is caused by

1. Muscles around the tubes tightening.
2. Mucus, or phlegm, in the tubes blocking them.
3. The walls of the tubes themselves becoming swollen.

**Why does this happen?** In asthma the bronchial tubes are sensitive to things which other people hardly notice. Things acting on these tubes can trigger an attack of asthma, e.g.

- Exercise.
- Infections such as colds or 'flu.
- Cold air.
- Irritants such as smoke or perfume.
- Allergic factors such as dust, grass pollen, animals (some asthmatics only).
- Something at work (rarely).
- Some drugs (rarely).

**Do emotional upsets cause asthma?** No, but getting upset can bring on an attack of wheeze, or make it worse.

**Will I always have asthma?** Many children outgrow asthma as teenagers. Adults with asthma normally have good and bad spells and will probably always have sensitive "tubes".

**What is the point of taking treatment for asthma?** With modern **regular** treatment we can **prevent** bad attacks of asthma and keep most people well most of the time. We can of course also treat attacks when they occur but it's always better to prevent them.

## How to know a bad attack of asthma

Things to look for, which show your asthma is getting worse, or is not properly controlled are:

1. Waking up at night wheezy and needing your inhaler.
2. Feeling your chest tight or wheezy when you awake in the morning.
3. Finding your quick acting inhaler (e.g. Ventolin, Bricanyl) is not helping the wheeze as it used to.

These things may happen after you've had a cold of 'flu or if you cut down on your usual treatment. Sometimes there is no obvious cause.

You should go and see your doctor if you notice these changes.

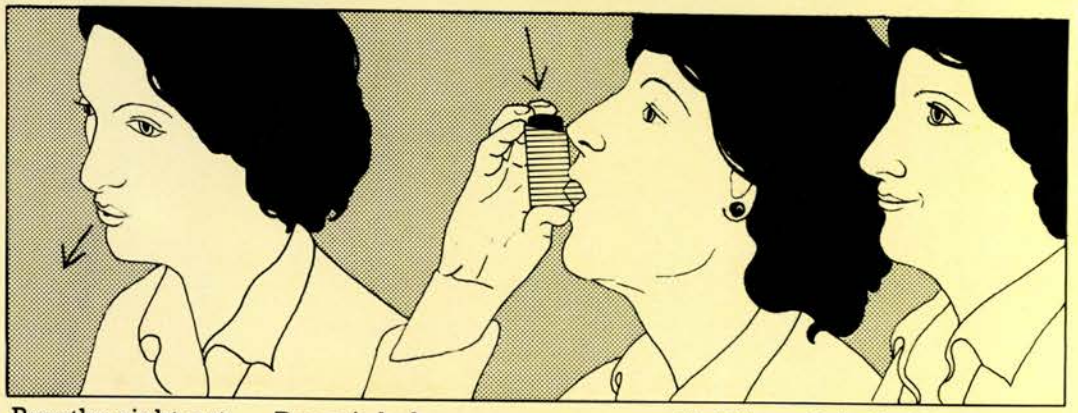
He may suggest increasing the dose of your inhaler (Intal, Becotide, etc.) or give you a course of tablets. he may after talking to you give you a supply of tablets to start on your own if you notice these things.

If you are very wheezy he may give you an injection or arrange for you to go to hospital. This is quite rare, and can usually be prevented if you know the warning signs, and what to do.

Quick acting inhalers

—if ordinary inhalers are difficult to use—

Long term preventive inhalers



Breathe right out. Press inhaler, taking a long, slow, breath in. Hold breath in for 10 seconds.

## Treatment of asthma

The two aims of treatment are:

1. To treat wheeze when it occurs.
2. To prevent wheeze and allow you to lead a normal life.

All drugs will do either one or other of these, so it's important to know which is doing which job if you are taking more than one medicine.

There are three important types of drugs —

1. Quick acting inhalers giving immediate relief.
2. Tablets giving more gradual relief.
3. Long term, preventive inhalers and tablets.

1. **Quick acting inhalers**
(e.g. Bricanyl, Ventolin)
These relax the bronchial tubes and allow air to move in and out of the lungs more easily. They act almost at once — the effect lasts up to six hours. They are usually given in a dose of two puffs four times daily, more if your doctor advises, or less if the wheeze stays away.

2. **Slow acting tablets**
(e.g. Phyllocontin, Theodur, Ventolin, Bricanyl)
This mixed group of tablets also act by relaxing the bronchial tubes. The effect takes longer to develop because they are taken in tablet form and have to be taken up in the blood stream from the stomach. They also act for longer than an inhaler and are good overnight for dealing with night-time wheeze.

3. **Long term, preventive treatment**

a) **Inhalers** (e.g. Intal, Becotide, Pulmicort, Becloforte)
These have **no immediate effects** but if taken regularly over a period of time will gradually improve wheeze.

b) **Steroid tablets** (e.g. Prednisolone)
These are used to treat an attack of asthma when you are too wheezy to use an inhaler properly; usually a course of at least 30 mg. daily is given for a week or 10 days in total. This does not cause side effects, but helps you get back to normal quickly.

In the long term steroids are sometimes used in a small daily morning dose IN ADDITION to a steroid inhaler (e.g Becotide or Becloforte) if the inhaler alone is not enough to control symptoms. It is important to keep using the inhaler, to keep the tablet dose low and so prevent side effects.

Finally — cough bottles won't help asthma. Antibiotics are only useful if you also have an attack of bronchitis.

**Remember — bad attacks of asthma don't happen suddenly, they usually build up over a period of days or weeks, and can be prevented if you know what to look out for, and what to do.**

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